

**ФОНД ОЦЕНОЧНЫХ СРЕДСТВ ПО ДИСЦИПЛИНЕ  
ПРИЕМ 2020 г.**

ФОРМА ОБУЧЕНИЯ очно-заочная

|                                                         |                                                              |         |   |
|---------------------------------------------------------|--------------------------------------------------------------|---------|---|
| Химия 1                                                 |                                                              |         |   |
| Направление подготовки/<br>специальность                | 21.03.01 «Нефтегазовое дело»                                 |         |   |
| Образовательная программа<br>(направленность (профиль)) | «Разработка и эксплуатация нефтяных и газовых месторождений» |         |   |
| Специализация                                           | «Разработка и эксплуатация нефтяных и газовых месторождений» |         |   |
| Уровень образования                                     | высшее образование - бакалавриат                             |         |   |
| Курс                                                    | 1                                                            | семестр | 1 |
| Трудоемкость в кредитах<br>(зачетных единицах)          | 3                                                            |         |   |
| Зав. каф.-руководитель<br>ОЕН ШБИП                      | И.В. Шаманин                                                 |         |   |
| Руководитель ООП                                        | Ю.А. Максимова                                               |         |   |
| Преподаватель                                           | Мирошниченко Ю.Ю.<br>Абрамова П.В.                           |         |   |

2020 г.

# 1. Роль дисциплины «Химия 1» в формировании компетенций выпускника:

| Элемент образовательной программы (дисциплина, практика, ГИА) | Семестр | Код компетенции | Наименование компетенции (СУОС)                                                                                                | Индикаторы достижения компетенций |                                                                                                                                                   | Составляющие результатов освоения дисциплины (дескрипторы компетенции) |                                                                                                                                                            |
|---------------------------------------------------------------|---------|-----------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                               |         |                 |                                                                                                                                | Код индикатора                    | Наименование индикатора достижения                                                                                                                | Код                                                                    | Наименование                                                                                                                                               |
| Химия 1                                                       | 1       | УК(У)-1         | Способен осуществлять поиск, критический анализ и синтез информации, применять системный подход для решения поставленных задач | И.УК(У)-1.1                       | Анализирует задачу, выделяя ее базовые составляющие                                                                                               | УК(У)-1.1В1                                                            | Владеет опытом применения законов естественных наук и математических методов и моделей для решения задач теоретического и прикладного характера            |
|                                                               |         |                 |                                                                                                                                |                                   |                                                                                                                                                   | УК(У)-1.1У1                                                            | Умеет решать задачи теоретического и прикладного характера                                                                                                 |
|                                                               |         |                 |                                                                                                                                |                                   |                                                                                                                                                   | УК(У)-1.1З1                                                            | Знает законы естественных наук и математические методы теоретического характера                                                                            |
|                                                               |         |                 | Способен осуществлять поиск, критический анализ и синтез информации, применять системный подход для решения поставленных задач | И.УК(У)-1.2                       | Осуществляет поиск, выделяет и ранжирует информацию на основе системного подхода и методов познания для решения задач по различным типам запросов | УК(У)-1.2В1                                                            | Владеет репродуктивными методами познавательной деятельности и мыслительными операциями для решения задач естественнонаучных дисциплин                     |
|                                                               |         |                 |                                                                                                                                |                                   |                                                                                                                                                   | УК(У)-1.2У1                                                            | Умеет обобщать усвоенные знания естественных наук категориями системного анализа и подхода и мыслительными операциями анализа, синтеза, сравнения и оценки |
|                                                               |         |                 |                                                                                                                                |                                   |                                                                                                                                                   | УК(У)-1.2З1                                                            | Знает репродуктивные методы познавательной деятельности, признаки системного подхода и системного анализа                                                  |

| Элемент образовательной программы (дисциплина, практика, ГИА) | Семестр | Код компетенции | Наименование компетенции (СУОС)                                                                                                                                        | Индикаторы достижения компетенций |                                                                                | Составляющие результатов освоения дисциплины (дескрипторы компетенции) |                                                                                                                                                                                                                                         |
|---------------------------------------------------------------|---------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                               |         |                 |                                                                                                                                                                        | Код индикатора                    | Наименование индикатора достижения                                             | Код                                                                    | Наименование                                                                                                                                                                                                                            |
| Химия 1                                                       | 1       | ОПК(У)-1        | Способен решать задачи, относящиеся к профессиональной деятельности, применяя методы моделирования, математического анализа, естественнонаучные и общинженерные знания | И.ОПК(У)-1.4.                     | Демонстрирует понимание химических процессов и применяет основные законы химии | ОПК(У)-1.4В1                                                           | Владеет методами теоретического и экспериментального исследования химических процессов и явлений, анализа и обработки экспериментальных данных                                                                                          |
|                                                               |         |                 |                                                                                                                                                                        |                                   |                                                                                | ОПК(У)-1.4У1                                                           | Умеет выявлять взаимосвязь между структурой, свойствами и реакционной способностью химических соединений, проводить стехиометрические расчеты                                                                                           |
|                                                               |         |                 |                                                                                                                                                                        |                                   |                                                                                | ОПК(У)-1.4З1                                                           | Знает основные понятия и законы химии, электронное строение атомов и молекул; основы теории химической связи в соединениях разных типов, строение и свойства координационных соединений, строение вещества в конденсированном состоянии |

## 2. Показатели и методы оценивания

| Планируемые результаты обучения по дисциплине |                                                                                                                                                  | Код индикатора достижения контролируемой компетенции (или ее части) | Наименование раздела дисциплины                                                                                                                              | Методы оценивания (оценочные мероприятия)                                                            |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Код                                           | Наименование                                                                                                                                     |                                                                     |                                                                                                                                                              |                                                                                                      |
| РД 1                                          | Применяет знания основных понятий и законов химии, современных теорий строения вещества для описания физических и химических свойств соединений. | И.УК(У)-1.1<br>И.УК(У)-1.2<br>И.ОПК(У)-1.4.                         | 1. Теоретические основы химии.<br>2. Строение атома и периодичность свойств химических элементов и их соединений.<br>3. Химическая связь и строение молекул. | Письменный опрос на практическом занятии.<br>Защита ИДЗ.<br>Тестирование – независимый контроль ЦОКО |
| РД 2                                          | Выполнять количественные расчеты по химическим формулам, уравнениям химических реакций и содержанию веществ в растворах,                         | И.УК(У)-1.1<br>И.УК(У)-1.2<br>И.ОПК(У)-1.4.                         | 1. Теоретические основы химии.<br>2. Строение атома и                                                                                                        | Письменный опрос на практическом занятии.<br>Защита ИДЗ.                                             |

|      |                                                                                                                                                                 |               |                                                                                                                                                              |                                          |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
|      | анализировать и обобщать полученные результаты.                                                                                                                 |               | периодичность свойств химических элементов и их соединений.<br>3. Химическая связь и строение молекул.                                                       | Тестирование – независимый контроль ЦОКО |
| РД 3 | Использовать экспериментальные методы исследования для установления состава, химических свойств веществ, приготовления растворов и определения их концентраций. | И.ОПК(У)-1.4. | 1. Теоретические основы химии.<br>2. Строение атома и периодичность свойств химических элементов и их соединений.<br>3. Химическая связь и строение молекул. | Защита отчета по лабораторной работе.    |

### 3. Шкала оценивания

Порядок организации оценивания результатов обучения в университете регламентируется отдельным локальным нормативным актом – «Система оценивания результатов обучения в Томском политехническом университете (Система оценивания)» (в действующей редакции). Используется балльно-рейтинговая система оценивания результатов обучения. Итоговая оценка (традиционная и литерная) по видам учебной деятельности (изучение дисциплин, УИРС, НИРС, курсовое проектирование, практики) определяется суммой баллов по результатам текущего контроля и промежуточной аттестации (итоговая рейтинговая оценка - максимум 100 баллов).

Распределение основных и дополнительных баллов за оценочные мероприятия текущего контроля и промежуточной аттестации устанавливается календарным рейтинг-планом дисциплины.

#### Рекомендуемая шкала для отдельных оценочных мероприятий входного и текущего контроля

| % выполнения задания | Соответствие традиционной оценке | Определение оценки                                                                                                                                                                                                           |
|----------------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 90%÷100%             | «Отлично»                        | Отличное понимание предмета, всесторонние знания, отличные умения и владение опытом практической деятельности, необходимые результаты обучения сформированы, их качество оценено количеством баллов, близким к максимальному |
| 70% - 89%            | «Хорошо»                         | Достаточно полное понимание предмета, хорошие знания, умения и опыт практической деятельности, необходимые результаты обучения сформированы, качество ни одного из них не оценено минимальным количеством баллов             |
| 55% - 69%            | «Удовл.»                         | Приемлемое понимание предмета, удовлетворительные знания, умения и опыт практической деятельности, необходимые результаты обучения сформированы, качество некоторых из них оценено минимальным количеством баллов            |
| 0% - 54%             | «Неудовл.»                       | Результаты обучения не соответствуют минимально достаточным требованиям                                                                                                                                                      |

### Шкала для оценочных мероприятий экзамена

| % выполнения заданий экзамена | Экзамен, балл | Соответствие традиционной оценке | Определение оценки                                                                                                                                                                                                           |
|-------------------------------|---------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 90%÷100%                      | 18 ÷ 20       | «Отлично»                        | Отличное понимание предмета, всесторонние знания, отличные умения и владение опытом практической деятельности, необходимые результаты обучения сформированы, их качество оценено количеством баллов, близким к максимальному |
| 70% - 89%                     | 14 ÷ 17       | «Хорошо»                         | Достаточно полное понимание предмета, хорошие знания, умения и опыт практической деятельности, необходимые результаты обучения сформированы, качество ни одного из них не оценено минимальным количеством баллов             |
| 55% - 69%                     | 11 ÷ 13       | «Удовл.»                         | Приемлемое понимание предмета, удовлетворительные знания, умения и опыт практической деятельности, необходимые результаты обучения сформированы, качество некоторых из них оценено минимальным количеством баллов            |
| 0% - 54%                      | 0 ÷ 10        | «Неудовл.»                       | Результаты обучения не соответствуют минимально достаточным требованиям                                                                                                                                                      |

## 2. Перечень типовых заданий

| Оценочные мероприятия |                                          | Примеры типовых контрольных заданий                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.                    | Письменный опрос на практическом занятии | <p>Примеры билетов:</p> <p><b>Тема «Строение атома»</b></p> <p>1. Какой набор квантовых чисел характеризует отмеченный электрон в атоме ванадия?</p> <div style="text-align: center;"> <math display="block">  \begin{array}{c}  4s \qquad 3d \\  \boxed{\uparrow\downarrow} \quad \boxed{\uparrow}\boxed{\uparrow}\boxed{\uparrow\downarrow}\boxed{\phantom{\uparrow\downarrow}}\boxed{\phantom{\uparrow\downarrow}}\boxed{\phantom{\uparrow\downarrow}}  \end{array}  </math> </div> <p>1) <math>n = 4, l = 3, m_l = 2, m_s = 1/2</math>      2) <math>n = 3, l = 2, m_l = -2, m_s = 1/2</math><br/> 3) <math>n = 3, l = 2, m_l = -1, m_s = 1/2</math>      4) <math>n = 3, l = 2, m_l = 0, m_s = 1/2</math></p> <p>2. У какой группы частиц электронные формулы одинаковые?<br/> 1) Li, Na, K    2) Na, Mg, Al    3) <math>\text{Na}^+, \text{Mg}^{2+}, \text{Al}^{3+}</math>    4) <math>\text{F}^-, \text{Cl}^-, \text{Br}^-</math></p> <p>3. Чему равен атомный номер элемента в Периодической системе, электронная формула которого <math>1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8</math>?</p> <p>4. Свойства гидроксидов элемента с краткой электронной формулой <math>4s^1</math><br/> 1. основные    2. кислотные    3. амфотерные</p> <p>5. Вещества с которыми взаимодействует оксид атома с формулой валентных электронов <math>3s^2 3p^5</math><br/> 1) NaOH    2) HCl    3) CaO    4) <math>\text{H}_2\text{O}</math>    5) <math>\text{SO}_3</math></p> <p><b>Тема: «Химическая связь: образование, виды и характеристики. Метод ВС и строение молекул»</b></p> <p>1. С позиций метода ВС ковалентная связь является:</p> |



|    | Оценочные мероприятия                 | Примеры типовых контрольных заданий                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                       | <p>2) Назовите комплексное соединение, напишите уравнение диссоциации и составьте выражение константы нестойкости для комплексного иона в соединении: <math>K_2Zn_3[Fe(CN)_6]_2</math></p> <p>3) Определите степень окисления и координационное число комплексообразователя в соединении: <math>K_4[Fe(CN)_6]</math></p> <p>4) Допишите уравнение реакции и назовите продукты и сравните устойчивость полученных комплексных соединений по значениям констант нестойкости:</p> $CuSO_4 + NH_4OH \rightarrow$ $Hg(NO_3)_2 + KI \rightarrow$ <p>5) С помощью метода ВС, определите тип гибридизации АО комплексообразователя в комплексном ионе <math>[Zn(OH)_4]^{2-}</math>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4. | Защита отчета по лабораторной работе. | <p>Контрольные вопросы по темам «Качественный анализ соли»:</p> <ol style="list-style-type: none"> <li>1. Какие реакции называются характерными?</li> <li>2. Напишите уравнения диссоциации следующих веществ: дихромат натрия, нитрат свинца (II), гексацианоферрата (III) калия.</li> <li>3. В подземных водах Западной Сибири возможно присутствие растворимых соединений железа (II). Приведите качественные реакции обнаружения катиона этого металла.</li> <li>4. Предложите способ идентификации солей: хлорид натрия, хлорид меди (II) и хлорид алюминия.</li> <li>5. Серная кислота используется в качественном анализе. Какие катионы и анионы можно обнаружить с помощью серной кислоты? Из имеющихся реактивов в штативе проведите эти реакции.</li> </ol> <p>Контрольные вопросы размещены в учебном пособии: Лабораторный практикум по общей и неорганической химии: учебное пособие / Н. Ф. Стась, А. А. Плакидкин, Е. М. Князева; Национальный исследовательский Томский политехнический университет (ТПУ). — 3-е изд., перераб. и доп. — Томск: Изд-во ТПУ, 2013. — URL: <a href="http://www.lib.tpu.ru/fulltext2/m/2014/m037.pdf">http://www.lib.tpu.ru/fulltext2/m/2014/m037.pdf</a> (дата обращения: 11.03.2020). — Режим доступа: из корпоративной сети ТПУ.- Текст: электронный.</p> |
| 5. | Защита ИДЗ.                           | <p>Вопросы:</p> <ol style="list-style-type: none"> <li>1. Какие соединения называются оксосолями? Приведите примеры оксосолей висмута, сурьмы, титана и ванадия. Как получают оксосоли? Напишите уравнения реакций.</li> <li>2. Напишите формулы соединений: оксид хрома (II), оксид сурьмы (V), гидроксид золота (III), перхлорат аммония, ортофосфат бария, метафосфат кальция, гидросульфит стронция, карбонат гидроксокадмия, тетрагидроксоплюмбат (II) натрия, циановодородная кислота. Укажите класс соединения, к которому относится каждое из перечисленных соединений. Изобразите</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

|    | Оценочные мероприятия                    | Примеры типовых контрольных заданий                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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|    |                                          | <p>графические формулы первых восьми соединений.</p> <p>3. Какие ученые внесли основной вклад в развитие атомно-молекулярного учения? Сформулируйте законы атомно-молекулярного учения. Сульфид железа (II) массой 44 г обработали избытком соляной кислоты. Рассчитайте объём (н.у.) газа, выделившийся в результате этой реакции.</p> <p>4. Уравняйте реакции методом электронного баланса, укажите окислитель, восстановитель и тип ОВР. Рассчитайте молярные массы эквивалентов окислителя и восстановителя.</p> $\text{MnO}_2 + \text{KNO}_3 + \text{KOH} \rightarrow \text{K}_2\text{MnO}_4 + \text{KNO}_2 + \text{H}_2\text{O}$ $\text{NaIO}_3 \rightarrow \text{NaI} + \text{O}_2$ <p>5. Изобразите аналитическую посуду (цилиндр, бюретка, градуированная пипетка, колба для титрования, воронка). Укажите область их применения. К 25%-ному раствору гидроксида калия объемом 400 мл с плотностью 1,23 г/мл, добавили 50 мл воды. Рассчитайте массовую долю вещества в полученном растворе.</p> <p>6. Какие атомные орбитали называют вырожденными? Как определяется число вырожденных атомных орбиталей на s-, p-, d- и f-подуровнях? Каким правилом следует руководствоваться при этом? Ответ обоснуйте на примере электроннографических формул атомов хлора, галлия и олова.</p> <p>7. Где в Периодической системе проходит граница Цинтля. Как особенности кристаллохимического строения простых веществ связаны с положением элементов относительно границы Цинтля?</p> <p>8. Как и почему изменяется пространственная конфигурация частиц при переходе от <math>\text{BF}_3</math> к <math>\text{BF}_4^-</math>; от <math>\text{NH}_3</math> к <math>\text{NH}_4^+</math> и от <math>\text{H}_2\text{O}</math> к <math>\text{H}_3\text{O}^+</math>? Ответ подтвердите схемами ВС.</p> |
| 6. | Тестирование – независимый контроль ЦОКО | <p><b>Примеры заданий к рубежному тестированию №1 и №2.</b></p> <p>1. При взаимодействии 0,9 г трёхвалентного металла с HCl выделился <math>\text{H}_2</math> объемом 1,21 л при 23 °С и давлении 101,3 кПа. Молярная масса эквивалента металла равна _____ г/моль.</p> <p>2. В углеводороде массовая доля углерода составляет 82,8 %, относительная плотность соединения по воздуху равна 1,03. Истинная формула соединения имеет вид _____.</p> <p>3. Кислая образуется при взаимодействии</p> <ol style="list-style-type: none"> <li>1) 1 моль гидроксида алюминия + 1 моль соляной кислоты</li> <li>2) 1 моль гидроксида цинка + 1 моль азотной кислоты</li> <li>3) 1 моль гидроксида кальция + 1 моль серной кислоты</li> <li>4) 1 моль гидроксида бария + 1 моль ортофосфорной кислоты</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Оценочные мероприятия | Примеры типовых контрольных заданий                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |                   |             |       |             |       |            |       |                |       |  |       |   |   |   |   |  |  |  |  |
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|                       | <p>4. Число неспаренных электронов в атоме с формулой валентных электронов <math>3s^23p^5</math> равно ____</p> <p>5. Частицы, содержащие одинаковое число электронов</p> <p>1) <math>F^-</math>    2) Ne    3) Na    4) Mg</p> <p>6. Номер набора квантовых чисел, характеризующий отмеченный электрон, в атоме эрбия</p> <div><div>6s<br/><div><div>↑</div><div>↓</div></div></div><div>4f<br/><div><div><div>↑</div><div>↓</div></div><div><div>↑</div><div>↓</div></div><div><div>↑</div><div>↓</div></div><div><div>↑</div><div>↓</div></div><div><div>↑</div><div>↓</div></div><div><div>↑</div><div>↓</div></div><div><div>↑</div><div>↓</div></div><div><div>↑</div><div>↓</div></div></div></div><p>1) <math>n = 4, l = 2, m_l = 3, m_s = -1/2</math>                      2) <math>n = 6, l = 0, m_l = 0, m_s = -1/2</math></p><p>3) <math>n = 6, l = 0, m_l = 1, m_s = -1/2</math>                      4) <math>n = 4, l = 3, m_l = 3, m_s = -1/2</math></p><p>7. В 3-м периоде наибольшая электроотрицательность у элемента под номером ____.</p><p>8. Массовая доля <math>Na_2SO_4</math> в 1 н растворе (<math>\rho = 1,1</math> г/мл) равна ____%. (Ответ дать с точностью до сотых).</p><p>9. Раствор приготовлен смешением 400 мл воды и 100 мл 96%-й <math>H_2SO_4</math> (<math>\rho = 1,84</math> г/мл). Титр раствора равен ____ г/мл. (Ответ дать с точностью до сотых)</p><p>10. Установите соответствие между формулой иона и степенью окисления центрального атома в нем.</p><table><thead><tr><th>ФОРМУЛА ИОНА</th><th>СТЕПЕНЬ ОКИСЛЕНИЯ</th></tr></thead><tbody><tr><td>А) <math>NO_3^-</math></td><td>1) +1</td></tr><tr><td>Б) <math>NO_2^-</math></td><td>2) +2</td></tr><tr><td>В) <math>ClO^-</math></td><td>3) +3</td></tr><tr><td>Г) <math>PO_4^{3-}</math></td><td>4) +4</td></tr><tr><td></td><td>5) +5</td></tr></tbody></table><table><thead><tr><th>А</th><th>Б</th><th>В</th><th>Г</th></tr></thead><tbody><tr><td></td><td></td><td></td><td></td></tr></tbody></table><p>11. Коэффициент перед формулой серной кислоты в уравнении реакции <math>FeSO_4 + KMnO_4 + H_2SO_4 \rightarrow Fe_2(SO_4)_3 + MnSO_4 + K_2SO_4 + H_2O</math> равен ____.</p><p>12. Донором электронной пары в молекуле CO является атом, химический символ которого ____.</p><p>13 В молекуле <math>PF_5</math> ____ -тип гибридизации орбиталей центрального атома.</p></div> | ФОРМУЛА ИОНА | СТЕПЕНЬ ОКИСЛЕНИЯ | А) $NO_3^-$ | 1) +1 | Б) $NO_2^-$ | 2) +2 | В) $ClO^-$ | 3) +3 | Г) $PO_4^{3-}$ | 4) +4 |  | 5) +5 | А | Б | В | Г |  |  |  |  |
| ФОРМУЛА ИОНА          | СТЕПЕНЬ ОКИСЛЕНИЯ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |                   |             |       |             |       |            |       |                |       |  |       |   |   |   |   |  |  |  |  |
| А) $NO_3^-$           | 1) +1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |                   |             |       |             |       |            |       |                |       |  |       |   |   |   |   |  |  |  |  |
| Б) $NO_2^-$           | 2) +2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |                   |             |       |             |       |            |       |                |       |  |       |   |   |   |   |  |  |  |  |
| В) $ClO^-$            | 3) +3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |                   |             |       |             |       |            |       |                |       |  |       |   |   |   |   |  |  |  |  |
| Г) $PO_4^{3-}$        | 4) +4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |                   |             |       |             |       |            |       |                |       |  |       |   |   |   |   |  |  |  |  |
|                       | 5) +5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |                   |             |       |             |       |            |       |                |       |  |       |   |   |   |   |  |  |  |  |
| А                     | Б                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | В            | Г                 |             |       |             |       |            |       |                |       |  |       |   |   |   |   |  |  |  |  |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |                   |             |       |             |       |            |       |                |       |  |       |   |   |   |   |  |  |  |  |

|    | Оценочные мероприятия | Примеры типовых контрольных заданий                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|    |                       | <p>14. Анионным комплексным соединением является</p> <p>1) <math>K_2[Zn(CN)_4]</math>                      2) <math>[Fe(CO)_5]</math>                      3) <math>[Cu(H_2O)_4]Cl_2</math>                      4) <math>[PtCl_3(H_2O)]Cl</math></p> <p>15. Для молекулы <math>NF_3</math> характерно:</p> <p>1) наличие 3 <math>\sigma</math>-связей</p> <p>2) sp тип гибридизации атомных орбиталей азота</p> <p>3) валентный угол 90</p> <p>4) наличие ковалентных полярных связей</p> <p>5) тетраэдрическая форма молекулы</p> <p>6) наличие 1 несвязывающей электронной пары</p> <p>Ответ: _____. (Запишите цифры в порядке возрастания)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 7. | Экзамен               | <p><b>Пример заданий экзамена</b></p> <p>1. Объем (н.у.) газообразного <math>Cl_2</math>, содержащий 10 молекул, равен _____ л. (Ответ дать с точностью до десятых)</p> <p>2. В углеводороде массовая доля углерода составляет 85,7 %, относительная плотность соединения по водороду равна 14. Истинная формула соединения имеет вид _____.</p> <p>3. Магний массой 62 г сожгли в 30 л (н.у.) кислорода <math>O_2</math>. Масса полученного оксида магния равна _____ г. (Ответ дать с точностью до десятых)</p> <p>4. При взаимодействии двухвалентного металла массой 13,08 г с разбавленной серной кислотой <math>H_2SO_4</math> выделяется 4,48 л <math>H</math> (н.у.). Химический символ металла _____.</p> <p>5. Формула амфотерного оксида 1) <math>BaO</math> 2) <math>ZnO</math> 3) <math>NO</math> 4) <math>SiO_2</math></p> <p>6. Гидроксид натрия не взаимодействует с</p> <p>1) <math>SiO_2</math> 2) <math>H_2SO_4</math> 3) <math>Al_2(SO_4)_3</math> 4) <math>Be(OH)_2</math> 5) <math>Ca(OH)_2</math> 3) <math>CH_3COOH</math> 6) <math>ZnO</math></p> <p>7. Высшая степень окисления элемента с формулой валентных электронов <math>4s^2 4p^2</math> равна _____.</p> <p>8. Установите последовательность расположения химических элементов по увеличению их электроотрицательности:</p> |

| Оценочные мероприятия | Примеры типовых контрольных заданий                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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|                       | <p>А) I    Б) Cl    В) F    Г) Br</p> <p>9. Значение "у" для атома с формулой валентных электронов <math>4s^x 4p^y</math>, образующих оксид <math>\text{Э}_2\text{O}_5</math>, равно ____.</p> <p>10. Для молекулы <math>\text{SF}_4</math> характерно:</p> <p>1) наличие ковалентных полярных связей<br/>2) sp тип гибридизации атомных орбиталей серы<br/>3) тетраэдрическая форма молекулы<br/>4) расположение гибридных атомных орбиталей серы в форме тригональной бипирамиды<br/>5) валентный угол 104,5<br/>6) наличие несвязывающих электронных пар</p> <p>11. Вещества с ковалентным типом химической связи 1) Fe 2) <math>\text{O}_2</math> 3) HF 4) NaI</p> <p>12. Октаэдрическую форму имеет молекула 1) <math>\text{H}_2\text{O}</math> 2) <math>\text{IF}_5</math> 3) <math>\text{SF}_6</math> 4) <math>\text{BF}_3</math></p> <p>13. Молекула, центральный атом которой имеет две несвязывающие электронные пары<br/>1) <math>\text{BF}_3</math> 2) <math>\text{CO}_2</math> 3) <math>\text{CF}_4</math> 4) <math>\text{H}_2\text{O}</math></p> <p>14. Масса NaOH, содержащаяся в 800 мл 0,2 н раствора, равна ____ г. (Ответ дать с точностью до десятых)</p> <p>15. Молярность раствора, полученного смешением 900 мл воды и 100 мл 60%-го раствора <math>\text{H}_2\text{SO}_4</math> (<math>\rho = 1,5</math> г/мл), равна ____ моль/кг. (Ответ дать с точностью до целого числа)</p> <p>16. Тип окислительно-восстановительной реакции</p> <p style="text-align: center;"><math>\text{NaBr} + \text{NaBrO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Br}_2 + \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}</math></p> <p>1 ) внутримолекулярная 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|  | Оценочные мероприятия | Примеры типовых контрольных заданий                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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|  |                       | 1) наличие двух несвязывающих атомных орбиталей<br>2) отсутствие $\pi$ -связей<br>3) валентный угол $120^0$<br>4) sp тип гибридизация атомных орбиталей кислорода<br>5) тетраэдрическая форма молекулы<br>6) наличие полярных ковалентных связей<br>20. Константы нестойкости комплексных ионов равны:<br>1) $[\text{Co}(\text{CN})_4]^{2-}$ $K_{\text{н}} = 8 \cdot 10^{-2}$<br>2) $[\text{Cd}(\text{CN})_4]^{2-}$ $K_{\text{н}} = 1 \cdot 10^{-19}$<br>3) $[\text{Zn}(\text{CN})_4]^{2-}$ $K_{\text{н}} = 2 \cdot 10^{-17}$<br>Концентрация ионов $\text{CN}^-$ наибольшая для комплексного иона под номером _____. |

### 3. Методические указания по процедуре оценивания

|    | Оценочные мероприятия                    | Процедура проведения оценочного мероприятия и необходимые методические указания                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| 1. | Письменный опрос на практическом занятии | <p>Практическое занятие заканчивается письменной проверочной работой, которая включает в себя 5 заданий, составленных преподавателем по теме практического занятия. На работу отводится 30 минут, затем студенты сдают свои работы. Каждое задание оценивается в 1,2 балла, таким образом, за данное оценочное мероприятие студент может получить до 6 баллов. Для подготовки к практическому занятию студенту необходимо проработать лекционный материал, материал учебников и/или учебных пособий.</p> <p>Требования к оформлению проверочной работы:</p> <ol style="list-style-type: none"> <li>В задании обязательно указываются следующая информация: номер задания, номер варианта, фамилия, имя, отчество студента; номер группы.</li> <li>Решение каждой задачи должно быть подробным, с включением промежуточных расчётов, указанием использованных законов, правил и формул; у получаемых в каждом действии численных величин указывается единица измерения (размерность).</li> </ol> <p><b>Критерии оценивания одного задания:</b></p> <ol style="list-style-type: none"> <li>Задание выполнено полностью верно – 1,2 балла.</li> <li>Задание выполнено наполовину верно – 0,6 балла.</li> <li>Задание не выполнено – 0 баллов.</li> </ol> |
| 2. | Защита ИДЗ                               | ИДЗ студента содержит 20 задач и упражнений из ДОП4, перечень которых находится в варианте                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|    | Оценочные мероприятия                | Процедура проведения оценочного мероприятия и необходимые методические указания                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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|    |                                      | <p>ИДЗ каждого студента. Темы охватывают все разделы программы дисциплины. Преподаватель обеспечивает своевременное получение студентами вариантов ИДЗ, а также предоставляет электронную ссылку на сборник задач и упражнений.</p> <p>ИДЗ выполняются в отдельной тетради, при оформлении каждого задания обязательно указывается его номер, приводится полностью текст условия каждого задания. Решение каждого задания должно быть подробным, с включением промежуточных расчётов, рассуждений, пояснений, с указанием использованных законов, правил и формул; у получаемых в каждом действии численных величин указывается единица измерения (размерность). ИДЗ проверяет преподаватель, ведущий лабораторные занятия. В течение недели студент должен решить не менее 2-х задач. Суммарный рейтинг за ИДЗ составляет 10 баллов.</p> <p><b>Критерии оценки одного задания:</b></p> <ul style="list-style-type: none"> <li>• Задание оформлено в соответствии с требованиями, выполнено верно и сдано в установленный срок – 0,5 балла.</li> <li>• Задание оформлено в соответствии с требованиями, в решении имеются ошибки – <math>0 \div 0,4</math> баллов</li> <li>• Задание оформлено не по требованиям, решено неверно и не в установленный срок – 0 баллов.</li> </ul> |
| 3. | Защита отчета по лабораторной работе | <p>В начале лабораторной работы студент получает допуск к работе, для этого он предоставляет преподавателю конспект лабораторной работы, в котором кратко изложены теоретические основы, сформулирована цель работы, присутствует экспериментальная часть, рисунки и таблицы экспериментальных данных (при необходимости). По окончании лабораторной работы студент сдает отчет, в котором приведены уравнения реакций, описаны наблюдения, приведены расчеты, сделан промежуточный вывод по каждому опыту, сделан общий вывод по лабораторной работе и защищает ее отвечая на контрольные вопросы (письменной/устной форме) к данной лабораторной работе. Суммарный рейтинг за лабораторную работу составляет 3 балла.</p> <p><b>Критерии оценки конспекта-отчета к лабораторной работе:</b></p> <ul style="list-style-type: none"> <li>• Подготовка к лабораторной работе – 0,5 балла.</li> <li>• Отчет по лабораторной работе – 1 балл.</li> </ul>                                                                                                                                                                                                                                                                                                                             |

| Оценочные мероприятия |                                          | Процедура проведения оценочного мероприятия и необходимые методические указания                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|                       |                                          | <ul style="list-style-type: none"> <li>Защита лабораторной работы – 0,5 балла.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4.                    | Тестирование – независимый контроль ЦОКО | <p>Рубежное тестирование (РТ) проводится в компьютерной форме в on-line режиме во время конференц-недели в середине и конце текущего семестра согласно расписанию.</p> <p>Перед тестированием студент проходит инструктаж. Продолжительность тестирования – 90 минут без перерыва. Отсчёт времени начинается с момента входа студента в «Тест». Студент может закончить выполнение теста до истечения отведённого времени.</p> <p>РТ нацелено на независимую объективную оценку знаний, умений и владений, полученных студентами за определенный промежуток обучения.</p> <p>Каждый вариант билета моделируется компьютером по заданным разделам химии и содержит 15 заданий. Студенты вносят ответы в компьютер, но все решения и пояснения записывают на бумаге. По окончании тестирования преподавателю выдается матрица ответов и суммарный рейтинг за тест. Результаты тестирования обсуждаются на консультации преподавателя.</p> <p><b>Критерии оценки одного задания:</b></p> <ul style="list-style-type: none"> <li>за каждое правильно выполненное задание выставляется 1 тестовый балл;</li> <li>за неправильно выполненное или невыполненное задание выставляется 0 баллов;</li> <li>для заданий с выбором нескольких правильных ответов, заданий на соответствие и установление последовательности предусмотрено частичное оценивание.</li> </ul> <p>Максимальный суммарный тестовый балл за каждое РТ составляет 15 баллов.</p> <p>За 2 недели до РТ студенты могут ознакомиться с демонстрационным вариантом билета, который располагается на сайте <a href="http://exam.tpu.ru">http://exam.tpu.ru</a> в разделе «Мероприятия», и может быть выполнен каждым студентом неограниченное число раз.</p> <p><i>Для студентов, не прошедших РТ в период проведения тестирования по уважительной причине, предусмотрена возможность тестирования в резервный день, который назначается сразу после конференц-недели.</i></p> <p><i>При результате рубежного тестирования 6 и менее баллов, обучающимся предоставляется в период текущей промежуточной аттестации возможность повторно пройти РТ в резервный день, согласованный с Бюро расписания ТПУ.</i></p> |
| 5.                    | Экзамен                                  | <p>Экзамен проводит ЦОКО в компьютерной форме в on-line режиме во время сессии согласно расписанию. Перед тестированием студент проходит инструктаж. Продолжительность тестирования – 180 минут без перерыва. Отсчёт времени начинается с момента входа студента в «Тест». Студент</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

|  | Оценочные мероприятия | Процедура проведения оценочного мероприятия и необходимые методические указания                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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|  |                       | <p>может закончить выполнение теста до истечения отведённого времени.</p> <p>Экзамен в тестовой форме направлен на независимую объективную оценку знаний, умений и владений, полученных студентами за определенный промежуток обучения.</p> <p>Каждый вариант билета моделируется компьютером по заданным разделам химии и содержит 20 заданий. Студенты вносят ответы в компьютер, но все решения и пояснения записывают на бумаге. По окончании тестирования преподавателю выдается матрица ответов и суммарный рейтинг за тест. Баллы за экзамен будут засчитаны по результатам устного собеседования. Устное собеседование включает теоретические вопросы, пояснения к решенным задачам, записанным во время тестирования (на листах) по тесту. Студент готовится в течении нескольких минут и далее отвечает на вопросы, сопровождая свой ответ пояснениями. Время ответа 10 минут.</p> <p><b>Критерии оценки одного задания:</b></p> <ul style="list-style-type: none"> <li>• за каждое правильно выполненное задание выставляется 1 тестовый балл;</li> <li>• за неправильно выполненное или невыполненное задание выставляется 0 баллов;</li> <li>• для заданий с выбором нескольких правильных ответов, заданий на соответствие и установление последовательности предусмотрено частичное оценивание.</li> </ul> <p>Максимальный суммарный балл за экзамен составляет 20 баллов.</p> <p>За 2 недели до экзамена студенты могут ознакомиться с демонстрационным вариантом билета, который располагается на сайте <a href="http://exam.tpu.ru">http://exam.tpu.ru</a> в разделе «Мероприятия», и может быть выполнен каждым студентом неограниченное число раз.</p> |