**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**Define the following vocabulary**

1. **Atom**
2. **Isotope**
3. **Ion**
4. **Bohr Model**
5. **Half Life**
6. **Ionic**
7. **Covalent**
8. **Formula**
9. **Periodic table**
   1. **Period**
   2. **Group**
   3. **Metal**
   4. **Metaloid**
   5. **Non-metal**
   6. **Transition metal**
10. **Atomic Radius**
11. **Electronegativity**
12. **Ionization energy**

**Be able to do the following**

1. **Determine the number of valence electrons on an atom**
2. **Describe electromagnetic radiation based on the Bohr model**
3. **Differentiate between types of radioactive decay**
4. **Describe the differences between ionic and covalent bonds**
5. **Describe a bond as ionic or covalent**
6. **Describe and define the parts of the periodic table, ie. Period, group, metal, non-metal etc**
7. **Describe trends in atomic radius, reactivity, and electronegativity**
8. **Relate electronegativity to atomic radius and ionization energy**
9. **Decribe how isotpes differ and explain why some are unstable**
10. **Calculate amount remaining if given half life**
11. **Describe why elements of the same period have similar properties**

**Additional resources.**

**Practice questions**

[**http://www.ncpublicschools.org/accountability/testing/eoc/sampleitems/**](http://www.ncpublicschools.org/accountability/testing/eoc/sampleitems/)

**Periodic Trends** [**http://www.youtube.com/watch?v=XMLd-O6PgVs**](http://www.youtube.com/watch?v=XMLd-O6PgVs)

**Ions and isotopes** [**http://www.youtube.com/watch?v=OaS7iQmzmrE**](http://www.youtube.com/watch?v=OaS7iQmzmrE)

**Bonding** [**http://www.youtube.com/watch?v=7DjsD7Hcd9U**](http://www.youtube.com/watch?v=7DjsD7Hcd9U)

**The attached released exam addresses the above goals in questions 1-16**

|  |  |  |
| --- | --- | --- |
| **Goal** | **Question** | **Possible Web sites for practice and review** |
| 1.1.1 | 1,2 | <http://phet.colorado.edu/en/simulation/build-an-atom> |
| 1.1.2 | 3 | <http://chemwiki.ucdavis.edu/Inorganic_Chemistry/Electronic_Configurations> |
| 1.1.3 | 5 | <http://abyss.uoregon.edu/~js/glossary/bohr_atom.html> |
| 1.1.4 | 6 | <http://www.fusd1.org/cms/lib03/AZ01001113/Centricity/Domain/1009/radioactive%20decay%20worksheet.pdf> |
| 1.2.1 | 7,10 | <http://www.wyzant.com/resources/lessons/science/chemistry/bonds> |
| 1.2.2 | 7,9 | <https://www.khanacademy.org/science/chemistry/periodic-table-trends-bonding/v/ionic--covalent--and-metallic-bonds> |
| 1.2.4 | 8.9.11.12 | <http://www.angelo.edu/faculty/kboudrea/general/formulas_nomenclature/Formulas_Nomenclature.htm> |
| 1.3.1 | 14,15 | <http://chemistry.about.com/library/blperiodictable.htm> |
| 1.3.3 | 16 | <http://www.chem.tamu.edu/class/majors/tutorialnotefiles/trends.htm> |

**North Carolina Essential Standards: Goal 2**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Essential Standard** | **Clarifying Objectives** | |
| **Chm.2.1** | **Understand the relationship among pressure, temperature, volume, and phase.** | **Chm.2.1.1** | Explain the energetic nature of phase changes |
| **Chm.2.1.2** | Explain heating and cooling curves (heat of fusion, heat of vaporization, heat, melting point, and boiling point) |
| **Chm.2.1.3** | Interpret the data presented in phase diagrams |
| **Chm.2.1.4** | Infer simple calorimetric calculations based on the concepts of heat lost equals heat gained and specific heat) |
| **Chm.2.1.5** | Explain the relationships among pressure, temperature, volume, and quantity of gas, both qualitative and quantitative) |
| **Chm.2.2** | **Analyze chemical reactions in terms of quantities, product formation, and energy.** | **Chm.2.2.1** | Explain the energy content of a chemical reaction |
| **Chm.2.2.2** | Analyze the evidence of chemical change. |
| **Chm.2.2.3** | Analyze the law of conservation of matter and how it applies to various types of chemical equations (synthesis, decomposition, single replacement, double replacement, and combustion) |
| **Chm.2.2.4** | Analyze the stoichiometric relations inherent in a chemical reaction |
| **Chm.2.2.5** | Analyze quantitatively the composition of a substance (empirical formula, percent composition, and hydrates) |

**The attached released exam addresses the above goals in questions 31 to 40 and 43.**

|  |  |  |
| --- | --- | --- |
| **Goal** | **Question** | **Possible Web sites for practice and review** |
| 2.1.1 | 17, 18 | <http://phet.colorado.edu/en/simulation/states-of-matter> |
| 2.1.2 | 19, 20, 21 | <http://hyperphysics.phy-astr.gsu.edu/hbase/thermo/phase2.html#c1>  <http://www.kentchemistry.com/links/Matter/HeatingCurve.htm>  <http://www.kentchemistry.com/links/Energy/ComplexCalProblems.htm> |
| 2.1.5 | 22, 23 | <http://www.thegeoexchange.org/chemistry/stoichiometry/liters-to-moles.html>  <http://chemistry.about.com/od/workedchemistryproblems/a/daltons-law-of-partial-pressures.htm> |
| 2.2.1 | 24, 25 | <http://www.kentchemistry.com/links/Kinetics/PEDiagrams.htm>  <http://phet.colorado.edu/en/simulation/reactions-and-rates> |
| 2.2.2 | 26 | <http://chemwiki.ucdavis.edu/Physical_Chemistry/Equilibria/Solubilty/Solubility_Rules> |
| 2.2.3 | 27, 28 | <http://misterguch.brinkster.net/eqnbalance.html>  <http://misterguch.brinkster.net/6typesofchemicalrxn.html> |
| 2.2.4 | 29, 30 | <http://www.sparknotes.com/chemistry/stoichiometry/stoichiometriccalculations/section1.rhtml#conversionfactors>  <http://www.sparknotes.com/chemistry/stoichiometry/stoichiometriccalculations/section2.rhtml>  <http://www.occc.edu/kmbailey/Chem1115Tutorials/Molar_Ratios.htm> |

**Chemistry Review for the North Carolina Final Exam (NC FE)**

Define the following vocabulary:

1. Vapor pressure
2. Energy
   1. Potential energy
   2. Kinetic energy
   3. Activation energy
3. Phase change
4. Heat
5. Temperature
6. Phase change
   1. Specific heat
   2. Heat of fusion
   3. Heat of vaporization
7. Endothermic vs Exothermic
8. Triple point
9. Ideal gas
10. Kinetic molecular theory (KMT)
11. Collision
12. Law of conservation of matter
13. Precipitate
14. Solubility
15. Acid-base neutralization
16. Empirical vs molecular formula
17. Percent composition

Explain the Concepts below:

1. What happens on a molecular level when a liquid-water system is heated? When it is cooled?
2. Explain what happens between molecules of a substance when it changes phase.
3. How are pressure, temperature, and volume related in determining the phase of matter? (think in terms of molecular interactions and by interpreting a phase diagram)
4. How are heat and temperature different?
5. Why does it take so much energy to boil water?
6. Draw reaction diagrams for exo- and endothermic reactions.
7. Be able to do calculations with Dalton’s Law, the Ideal Gas Law, and the Combined Gas Law.
8. Why does changing the temperature change the vapor pressure? (think in terms of molecular interactions)
9. What conditions must be satisfied, on a molecular level, in order for chemicals to react? (think in terms of molecular interactions)
10. How can we know if a chemical reaction has occurred?
11. In a laboratory, how can we test for the production of carbon dioxide? Hydrogen gas?
12. Be able to balance equations.
13. Be able to predict the products of chemical reactions using the reaction types in the reference tables.
14. Using the concept of reactivity, apply the activity series of metals to predict if a reaction will occur.
15. Using the concept of solubility, apply the solubility rules to predict if a reaction will occur.
16. Use a balance chemical equation to predict how much of a product will be formed given moles of a reactant.
17. Convert among moles, particles, mass, or liters of a gas.
18. Calculate percent composition of a compound.
19. Find the empirical and molecular formulas given experimental data.

Additional Websites

Activity series 🡪 <http://chemistry.about.com/od/chartstables/a/Activity-Series-Of-Metals.htm>

Solubility rules 🡪 <http://chemistry.about.com/od/workedchemistryproblems/a/How-To-Predict-Precipitates.htm>

Evidence of a chemical reaction 🡪 <https://www.youtube.com/watch?v=JSiBSSFKRwE>

Balancing equations 🡪 <http://education.jlab.org/elementbalancing/>

Gas Laws and KMT 🡪 <https://www.youtube.com/watch?v=BxUS1K7xu30>

**North Carolina Essential Standards: Goal 3**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Essential Standard** | **Clarifying Objectives** | |
| **Chm.3.1** | **Understand the factors affecting rate of reaction and chemical equilibrium** | **Chm.3.1.1** | Explain the factors that affect the rate of a reaction(temperature, concentration, particle size and presence of a catalyst |
| **Chm.3.1.2** | Explain the conditions of a system at equilibrium |
| **Chm.3.1.3** | Inter the shift in equilibrium when a stress is applied to a chemical system (Le Chatelier’s Principle) |
| **Chm.3.2** | **Understand solutions and the solution process** | **Chm.3.2.1** | Classify substances using hydronium and hydroxide concentrations |
| **Chm.3.2.2** | Summarize the properties of acids and bases |
| **Chm.3.2.3** | Infer the quantitative nature of a solution (molarity, dilution and titration with 1:1 molar ratio) |
| **Chm.3.2.4** | Summarize the properties of solutions |
| **Chm.3.2.5** | Interpret solubility diagrams |
| **Chm.3.2.6** | Explain the solution process |

**The attached released exam addresses the above goals in questions 31 to 40 and 43.**

|  |  |  |
| --- | --- | --- |
| **Goal** | **Question** | **Possible Web sites for practice and review** |
| 3.1.1 | 31, 32 | <http://www.education.com/study-help/article/chemical-equilibrium/> |
| 3.1.3 | 33,34 | <http://phet.colorado.edu/en/simulation/reactions-and-rates> |
| 3.2.1 | 35, 36 | <http://www.education.com/study-help/article/chemical-equilibrium/> <http://phet.colorado.edu/en/simulation/reversible-reactions> <http://antoine.frostburg.edu/chem/senese/101/acidbase/faq/what-is-pH.shtml> |
| 3.2.3 | 37 | <http://phet.colorado.edu/en/simulation/molarity> <http://www.chemteam.info/Solutions/Solutions.html> |
| 3.2.5 | 38, 39 | <http://www.sciencegeek.net/Chemistry/taters/solubility.htm> <http://www.kentchemistry.com/links/Kinetics/SolubilityCurves.htm> |
| 3.2.6 | 40 | <http://www.chemteam.info/Solutions/Solutions.html> |
| 3.2.2 | 43 | <http://phet.colorado.edu/en/simulation/ph-scale> <http://phet.colorado.edu/en/simulation/acid-base-solutions> <http://www.greenwood.wa.edu.au/resources/Chemistry%203A%20WestOne/content/006_forces_molecules/page_07.htm> |

Define the following vocabulary:

1. Equilibrium
2. Equilibrium expression, K
3. Stress on a system
   1. Heat
   2. Concentration
   3. Pressure/volume
4. Arrhenius Base/acid
5. Bronsted Base/acid
6. Hydroxide ion
7. Hydrogen ion
8. Acid-base indicators
9. Electrolytic
10. Electrolyte
11. Solution
12. Dissolve
13. Covalent vs. ionic
14. Solubility curves
15. Saturated solution
16. Supersaturated
17. Catalyst (include energy diagram)
18. Molarity (include equation)
19. Density (include equation)
20. Dilution (include equation)

Explain the Concepts below:

1. What types of solutions are conductive? Why?
2. How can you change the rate of a chemical reaction? Think about collisions and what would increase the probability a collision will occur.
3. Why do we take the log of hydrogen ion concentration?
4. What parts of a chemical reaction equation is included in the equilibrium constant? Describe a system at equilibrium.
5. Explain how a solubility curve works. Where would you find chemicals that are soluble in water?
6. Draw a titration curve and explain the different parts.
7. Using the particle model, show how mixing a strong acid and strong base produces water. Describe the process.
8. Create a chart on how stress on a chemical reaction can change the amount of the product formed or produce reactants.
9. At the particle level show how water dissolves ions. Provide both a dilute and concentrated example.
10. Explain how the amount of particles in a gas can increase pressure. Support your answer with the correct mathematical equation. (If you do not remember, where would you find the equation?)

Additional Websites for answer and practice questions: <http://dl.clackamas.cc.or.us/ch105-05/calculat1.htm> and <http://dl.clackamas.cc.or.us/ch105-05/calculat1.htm>

YouTube: <http://www.youtube.com/watch?v=Q93TfidSKlk> , equilibrium, <http://www.youtube.com/watch?v=F2BRpFihX3M> concentration and molarity, <http://www.youtube.com/watch?v=Ko5iDMYzwWE> and <http://www.youtube.com/watch?v=Vbh52HDorkc> acid/bases <http://www.youtube.com/watch?v=AN4KifV12DA> solutions and water