Regents Exam In Chemistry Review Homework #1

Name_____

1) How many protons are in an atom of iron?_____

2) How many neutrons are in the nucleus of Ca-41?_____

3) What is the most common isotope of argon?_____

4) What is the nuclear charge of an atom of calcium?_____

5) What is the mass of an electron?_____

6) Based on Reference Table N, write the decay equation for Tc-99_____

7) What is nuclear fusion?_____

8) Nuclear reactions give off thousands of times more energy than chemical reactions. Where does this energy come from?

_____

9) Draw the dot diagram for an atom of N:_____

10) Draw the dot diagram for an ion of N^{-3}:_____

11) Explain how a photon of light is formed:_____

_____

12) Ernest Rutherford shot alpha particles at gold foil. What happened to the alpha particles?

_____

13) What did this show about the structure of the atom?

_____

14) Write an electron configuration for oxygen that is in the excited state._____

15) An atomic mass unit (amu) is defined as what fraction of what isotope's mass?_____

Regents Exam In Chemistry Review Homework #2

Name_____

1) What is the geometric shape that solid substances are found in called?_____

2) Why do ionic liquids conduct electricity, while ionic solids do not?_____

_____

_____

3) Two samples of different gases each occupy 4.0 L at STP. What is true about the number of molecules contained in each of the two samples?

_____

4) What is the vapor pressure of ethanol at a temperature of $50^{o}C$?_____

5) What is the boiling point of propanone under a pressure of 20 kPa?_____

6) What is the normal boiling point of ethanoic acid?_____

7) What happens to the boiling point of water if a solute is dissolved into it?_____

8) What happens to the melting point of water if a solute is dissolved into it?_____

9) As temperature increases, pressure on a sample of confined gas will _____

10) Give two examples of physical properties:_____ and _____

11) Give two examples of chemical changes:_____ and _____

12) Why do metals conduct electricity?_____

_____

13) What three types of substances are able to conduct electricity?_____

_____

14) How many valence electrons do all ions (except H, Li, Be and B) have?_____

15) This many valence electrons is called _____

Regents Exam In Chemistry Review Homework #3

Name_____

For the reaction N_2 (g) + 3 H_2 (g) ⟺ 2 NH_3 (g) + 91.8 kJ:

1) List one way in which the forward reaction can be made faster:_____

2) Is this reaction exothermic or endothermic? Explain how you can tell._____

_____

3) If this reaction were carried out in a calorimeter, would the temperature of the water in the calorimeter increase of decrease? Explain.

_____

4) Draw a PE Diagram sketch of what this reaction would look like. Label the $H_{reactants}$, $H_{products}$, $H_{activated\ complex}$, ΔH and activation energy.

PE |

reaction coordinate--->
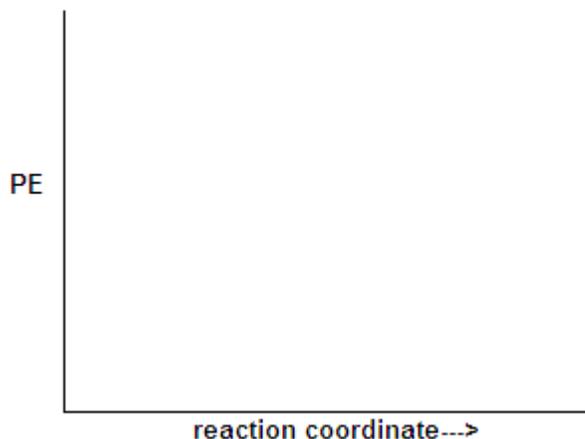
5) List three ways in which this equilibrium can be stressed that will result in an increase in the NH_3 (g) concentration:

_____, _____ and _____

6) What kind of reaction is this?_____

7) Determine the charge of each species in the above reaction and write the:

a) oxidation half-reaction:_____ reduction half-reaction:_____

b) oxidizing agent:_____   d) reducing agent:_____

9) How many moles of H_2 (g) are required to completely react with 4.0 moles of N_2 (g)? Show your work.

10) How many moles of NH_3 (g) are formed when 3.0 moles of H_2 (g) are completely reacted with N_2 (g)? Show work:

Regents Exam In Chemistry Review Homework #4

Name_____

A solution contains 20. grams of KNO_3 dissolved into 100. grams of water at 40.ºC.

1) Is this solution saturated, unsaturated or supersaturated?_____

2) Explain how you can tell._____

3) By how many degrees does the solution have to be raised/lowered to make it saturated?_____

4) How many grams can be added/ will precipitate to make the solution saturated?_____

5) Is the solution a homogenous or heterogeneous mixture?_____

6) Explain your answer to 5)._____

7) How can KNO_3 be made more soluble in water?_____

8) What is the name of the compound KNO_3?_____

9) What is KNO_3's formula mass?_____

10) Is KNO_3 an empirical or molecular formula?_____

11) Explain your answer to 10)._____

12) Determine the percent composition, by mass, of each element in KNO_3, showing all work:

%K: %N: %O:

13) 5.0 moles of KNO_3 are dissolved into 3.0 L of solution. Calculate the molarity of the solution, showing work:

14) How many grams of KNO_3 are needed to make 2.0 L of 0.50 M KNO_3 solution? Show all work:

Regents Exam In Chemistry Review Homework #5

Name_____

A) 100.0 grams of liquid water are at 0°C.

1) If heat is removed from this water, what phase change will occur?_____

2) How many joules per gram are required to undergo this phase change?_____

3) How many joules are required for 100.0 g of water to undergo this phase change?_____

4) What happens to the temperature of the water as it undergoes this phase change?_____

5) Oxygen undergoes this phase change at 55 K. Convert this temperature to °C:_____

6) Which molecule has stronger attractive forces, H_2O or O_2?_____

7) Draw the structural formula for a molecule of water:

8) Draw the dot diagram for a molecule of water:

9) Is a water molecule polar or nonpolar? Explain how you determined this.

_____, because_____.

10) What is the name for the type of attractive forces holding molecules of water together?_____

11) What type of bond holds an H atom to an O atom?_____

12) How did you determine your answer to 11)?_____

13) When NaCl dissolves in water, which ion is the oxygen end of the water molecule attracted to?_____

14) Explain your answer to 13)_____

15) When NaCl is dissolved into water, what happens to the freezing point of the water?_____

16) **For AE:** What will the freezing point of water be if NaCl is added until the concentration is 2.0 molal? Show your work:

Name_____

200.0 grams of liquid water are heated from 20.0^{o}C to 70.0^{o}C.

1) Is this a physical or chemical change?_____

2) Explain your answer to 1)_____

3) What happens to the viscosity of the water as it is being heated?_____

4) What happens to the vapor pressure of the water as it is being heated?_____

5) What happens to the kinetic energy of the water as it is being heated?_____

6) What happens to the entropy of the water as it is being heated?_____

7) How many joules of energy must be added to the water to make it undergo this temperature change? Show work:

8) Which will react faster? Na (s) + H$_2$O (l) at 20°C, or Na (s) + H$_2$O (l) at 70°C?_____

9) Explain your answer to 8) in terms of collision theory;_____

10) 2 Na (s) + H$_2$O (l) → H$_2$ + _____ Complete the reaction.

11) What type of chemical reaction is this?_____

12) Identify the species being oxidized in question 10)._____

12) Based on the Alternate Theory definition of acids and bases, is the water acting as an acid or base in the reaction in question 10? Explain.

_____, because_____

13) Is the product you wrote the formula for in question 10 an acid or a base? Explain how you can tell:

_____, because_____

14) Water has a pH of 7. If the concentration of OH$^-$ ions increases 1000 times as Na is added to the water, what will the new pH be?

_____

15) What color will methyl orange be in this pH?_____

16) If 20.0 mL of 4.0 M H$_2$SO$_4$ are needed to completely neutralize 80.0 mL of NaOH solution, then what is the molarity of the NaOH solution? Show your work.

Regents Exam In Chemistry Review Homework #7

Name_____

A battery is made using the reaction Mg + AgNO$_3$ → Mg(NO$_3$)$_2$ + Ag.

1) Select a metal on Table J that would also work in this reaction:_____

2) Explain why the metal you chose would work:_____

3) Balance the reaction _____Mg + _____AgNO$_3$ → _____Mg(NO$_3$)$_2$ + _____Ag.

4) Write the charge of each species in this reaction:

$$\frac{}{Mg} + \frac{}{AgNO_3} → \frac{}{Mg(NO_3)_2} + \frac{}{Ag.}$$

5) Write the oxidation half-reaction:_____

6) Write the reduction half-reaction:_____

7) Identify the oxidizing agent:_____ Reducing Agent:_____ Spectator Ion:_____

8) Draw and label a voltaic cell based on this reaction. Label the following:

Anode, cathode, + electrode, - electrode, direction electrons take, composition of all electrodes and solutions, load, salt bridge, direction that anions go across the salt bridge and direction that cations go across the salt bridge.
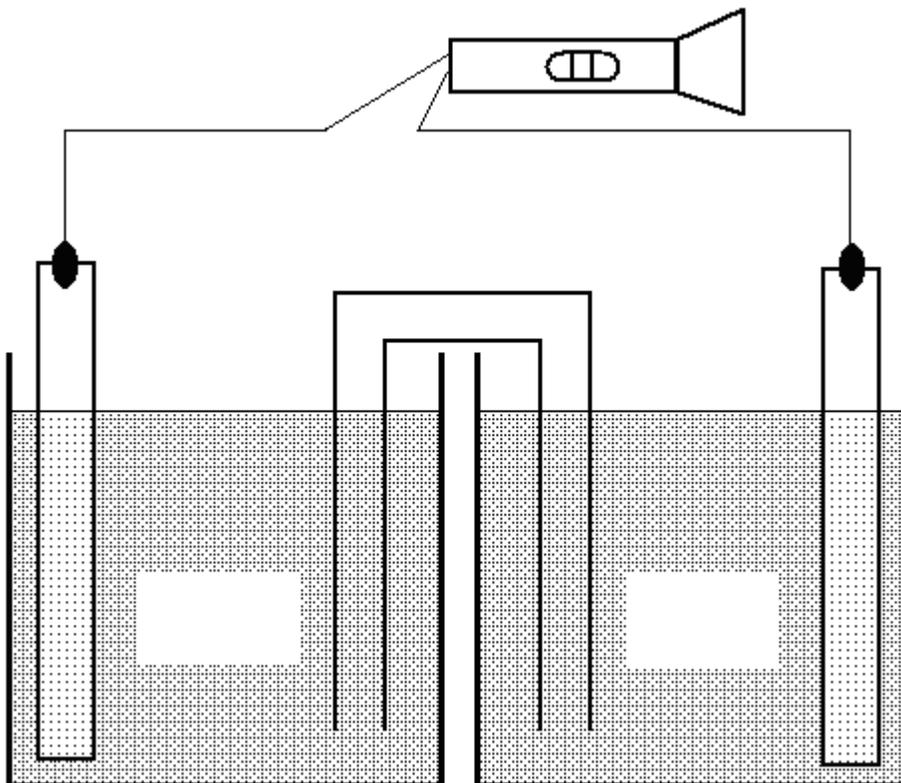
Regents Exam In Chemistry Review Homework #8

Name_____

For the reaction KCl → K + Cl$_2$:

1) Balance the reaction: _____**KCl** → _____**K** + _____**Cl$_2$**

2) Identify what type of reaction is represented here:_____

3) What phase does the KCl have to be in in order to electrolytically decompose the compound?_____

4) K will form at the _____ charged electrode (the _____ode), where _____ occurs.

5) Cl$_2$ will form at the _____ charged electrode (the _____ode), where _____ occurs.

6) Write the oxidation half-reaction:_____

7) Write the reduction half-reaction:_____

8) How many moles of Cl$_2$ will form if 4.0 moles of KCl are decomposed? Show your work.

9) Sargent-Welch has ordered 100. moles of K from your company. How many moles of KCl must be decomposed to make the order? Show your work.

10) Cl$_2$ is a gas. It can be collected by trapping it under water. Will the Cl$_2$ be soluble in the water? Explain, in terms of molecular polarity.

_____, because_____

11) What is the name of the group on the Periodic Table that K belongs to?_____

12) Write the dot diagram for an atom of K:_____

13) Write the dot diagram for a molecule of Cl$_2$:_____

14) Is this reaction a physical or chemical change?

_____, because_____

15) Why is this reaction considered a redox reaction?

_____

_____