

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.1) The molarity of a solution prepared by diluting 43.72 mL of 5.005 M aqueous $K_2Cr_2O_7$ to 500 mL is 1) _____

- A) 0.0879 B) 0.0044 C) 57.2 D) 0.870 E) 0.438

Answer: E

2) Of the species below, only _____ is NOT an electrolyte. 2) _____

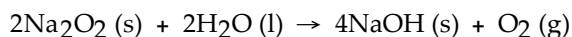
- A)
- Rb_2SO_4
- B) LiOH C)
- $C_6H_{12}O_6$
- D) HCl E) KCl

Answer: C

3) How many milliliters of a stock solution of 11.1 M HNO_3 would be needed to prepare 0.500 L of 0.500 M HNO_3 ? 3) _____

- A) 22.5 B) 2.78 C) 0.0444 D) 0.0225 E) 44.4

Answer: A

4) The value of ΔH° for the reaction below is -126 kJ. _____ kJ are released when 2.00 mol of NaOH is formed in the reaction? 4) _____

- A) 63 B)
- -126
- C) 7.8 D) 252 E) 3.9

Answer: A

5) Lithium does not occur in nature as Li (s) because _____. 5) _____

- A) it is easily replaced by silver in its ores
-
- B) it is easily oxidized to
- Li^+
-
- C) it is easily reduced to
- Li^-
-
- D) it reacts with water with great difficulty
-
- E) it undergoes a disproportionation reaction to
- Li^-
- and
- Li^+

Answer: B

6) Of the following, which one is a state function? 6) _____

- A) heat
-
- B) E
-
- C) w
-
- D) q
-
- E) none of the above

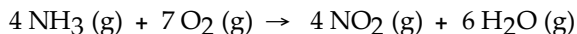
Answer: B

7) Specific heat is defined as heat transferred per gram per _____. 7) _____

- A) unit energy B) degree Celsius
-
- C) unit work D) degree Fahrenheit

Answer: B

8) The combustion of ammonia in the presence of excess oxygen yields NO_2 and H_2O : 8) _____



The combustion of 1.69 moles of ammonia consumes _____ moles of oxygen.

- A) .966 B) .0966 C) 11.83 D) 6.76 E) 2.96

Answer: E

9) Which of the following is a statement of Hess's law? 9) _____

- A) The ΔH of a reaction depends on the physical states of the reactants and products.
- B) The ΔH for a process in the forward direction is equal in magnitude and opposite in sign to the ΔH for the process in the reverse direction.
- C) The ΔH for a process in the forward direction is equal to the ΔH for the process in the reverse direction.
- D) If a reaction is carried out in a series of steps, the ΔH for the reaction will equal the product of the enthalpy changes for the individual steps.
- E) If a reaction is carried out in a series of steps, the ΔH for the reaction will equal the sum of the enthalpy changes for the individual steps.

Answer: E

10) Which one of the following compounds is insoluble in water? 10) _____

- A) ZnS B) Na_2CO_3 C) $\text{Fe}(\text{NO}_3)_3$ D) AgNO_3 E) K_2SO_4

Answer: A

11) The balanced net ionic equation for precipitation of CaCO_3 when aqueous solutions of Na_2CO_3 and CaCl_2 are mixed is _____. 11) _____

- A) $2\text{Na}^+ (\text{aq}) + \text{CO}_3^{2-} (\text{aq}) \rightarrow \text{Na}_2\text{CO}_3 (\text{aq})$
- B) $\text{Na}_2\text{CO}_3 (\text{aq}) + \text{CaCl}_2 (\text{aq}) \rightarrow 2\text{NaCl} (\text{aq}) + \text{CaCO}_3 (\text{s})$
- C) $\text{Na}^+ (\text{aq}) + \text{Cl}^- (\text{aq}) \rightarrow \text{NaCl} (\text{aq})$
- D) $\text{Ca}^{2+} (\text{aq}) + \text{CO}_3^{2-} (\text{aq}) \rightarrow \text{CaCO}_3 (\text{s})$
- E) $2\text{Na}^+ (\text{aq}) + 2\text{Cl}^- (\text{aq}) \rightarrow 2\text{NaCl} (\text{aq})$

Answer: D

12) In which species does sulfur have the highest oxidation number? 12) _____

- A) S_8 (elemental form of sulfur)
- B) K_2SO_4
- C) H_2S
- D) H_2SO_3
- E) SO_2

Answer: B

13) The value of ΔH° for the reaction below is +128.1 kJ: 13) _____



How many kJ of heat are consumed when 4 mol of H_2 (g) are formed as shown in the equation?

- A) 62.0 B) 128.1 C) 256.2 D) 326 E) 653

Answer: C

- 14) With which of the following will nitrate ion form an insoluble salt? 14) _____
A) potassium ion
B) sodium ion
C) lead ion
D) silver ion
E) none of the above

Answer: E

- 15) Calculate the value of ΔE in joules for a system that loses 50 J of heat and has 150 J of work performed on it by the surroundings. 15) _____
A) -100 B) 50 C) +200 D) 100 E) -200

Answer: D

- 16) When aqueous solutions of _____ are mixed, a precipitate forms. 16) _____
A) K_2SO_4 and $CrCl_3$
B) KOH and $Ba(NO_3)_2$
C) NaI and KBr
D) Li_2CO_3 and CsI
E) $NiBr_2$ and $AgNO_3$

Answer: E

- 17) A strong electrolyte is one that _____ completely in solution. 17) _____
A) reacts B) decomposes C) ionizes D) disappears

Answer: C

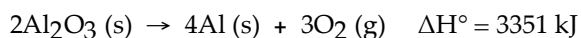
- 18) What is the maximum amount of SO_3 in moles that can be produced by the reaction of 1.0 mol of S with 1.0 mol of O_2 via the equation below? 18) _____



- A) 1 B) 0.66 C) 2 D) 1.5 E) 3

Answer: B

- 19) The reaction 19) _____



is _____, and therefore heat is _____ by the reaction.

- A) endothermic, absorbed
B) exothermic, released
C) exothermic, absorbed
D) endothermic, released
E) thermoneutral, neither released nor absorbed

Answer: A

20) The balanced reaction between aqueous potassium hydroxide and aqueous sulfuric acid is 20) _____

- _____.
- A) $2\text{KOH}(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{K}_2\text{SO}_4(\text{aq})$
 - B) $2\text{KOH}(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{KH}_2\text{SO}_4(\text{aq}) + \text{O}_2(\text{g})$
 - C) $2\text{KOH}(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{K}_2\text{SO}_4(\text{aq}) + 2\text{H}_2(\text{g})$
 - D) $2\text{KOH}(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow 2\text{OH}^-(\text{l}) + \text{HSO}_4^+(\text{aq}) + \text{K}(\text{s})$
 - E) $\text{KOH}(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{HOH}_2\text{SO}_4(\text{aq}) + \text{K}(\text{s})$

Answer: A

21) For which one of the following reactions is the value of $\Delta H^\circ_{\text{rxn}}$ equal to ΔH_f° for the product? 21) _____

- A) $3\text{Mg}(\text{s}) + \text{N}_2(\text{g}) \rightarrow \text{Mg}_3\text{N}_2(\text{s})$
- B) $2\text{C}(\text{graphite}) + \text{O}_2(\text{g}) \rightarrow 2\text{CO}(\text{g})$
- C) $\text{C}_2\text{H}_2(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{C}_2\text{H}_4(\text{g})$
- D) $\text{C}(\text{diamond}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$
- E) $2\text{Ca}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{CaO}(\text{s})$

Answer: A

22) Combining aqueous solutions of BaI_2 and Na_2SO_4 produces a precipitate of BaSO_4 . Which ion(s) 22) _____
is/are spectator ions in the reaction?

- A) Ba^{2+} and SO_4^{2-}
- B) Ba^{2+} only
- C) SO_4^{2-} and I^-
- D) Na^+ and I^-
- E) Na^+ only

Answer: D

23) Which of the following are strong electrolytes? 23) _____

- HCl
- $\text{C}_6\text{H}_{12}\text{O}_6$
- NH_3
- KCl
- A) HCl, NH_3 , KCl
- B) HCl, $\text{C}_6\text{H}_{12}\text{O}_6$, KCl
- C) HCl, $\text{C}_6\text{H}_{12}\text{O}_6$, NH_3 , KCl
- D) HCl, KCl
- E) $\text{C}_6\text{H}_{12}\text{O}_6$, KCl

Answer: D

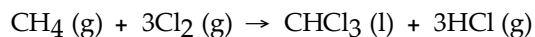
24) When a system _____, ΔE is always negative. 24) _____

- A) gives off heat and does work
- B) absorbs heat and has work done on it
- C) absorbs heat and does work
- D) gives off heat and has work done on it
- E) none of the above is always negative.

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 25) (5 pts) The value of ΔH° for the reaction below is -336 kJ . Calculate the heat (kJ) released to the surroundings when 23.0 g of HCl is formed. 25) _____



Answer: 70.7

- 26) (4 pts) Calculate the oxidation number of P in each of the following : 26) _____



Answer: 5, 1

- 27) (3 pts) During the precipitation reactions demonstrated in class, $\text{Cu}(\text{OH})_2$ was a blue solid, $\text{Ni}(\text{OH})_2$ was a green solid and this metal precipitated with I^- to form a bright, paint-like yellow. What metal ion was used? 27) _____

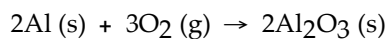
Answer: Pb

- 28) (3 pts) Milk of magnesia ($\text{Mg}(\text{OH})_2$) is a cloudy white liquid because $\text{Mg}(\text{OH})_2$ is a _____ in water. 28) _____

Answer: solid / precipitate

29) (3 pts) The value of ΔH° for the following reaction is -3351 kJ:

29) _____



The value of ΔH_f° for $\text{Al}_2\text{O}_3 \text{(s)}$ is _____ kJ.

Answer: -1676

30) (4 pts) The specific heat capacity of lead is 0.13 J/g-K. How much heat (in J) is required to raise the temperature of 15 g of lead from 22°C to 37°C?

30) _____

Answer: 29

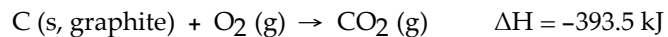
31) (4 pts) The molarity (M) of an aqueous solution containing 52.5 g of sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) in 35.5 mL of solution is _____.

31) _____

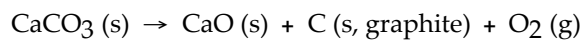
Answer: 4.32

32) (4 pts) Given the following reactions

32) _____



the enthalpy of the reaction



is _____ kJ.

Answer: 571.6

33) (3 pts) If an equal number of moles of each of the following species were placed in water which would have the highest conductivity?

33) _____

CaCl₂, K₂SO₄, K₃PO₄, C₆H₁₂O₆, PbCl₂

Answer: K₃PO₄

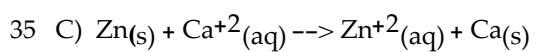
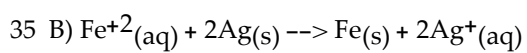
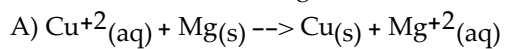
34) (3 pts) A base is defined as:

34) _____

Answer: Something that increases the concentration of OH⁻ ions.

35) (6 pts) Using the activity series, which lists which metals get oxidized the easiest, determine if the following reactions will occur or not:

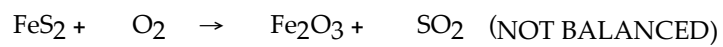
35) _____



Answer: Yes, No, No

36) (6 pts) If 294 grams of FeS₂ is allowed to react with 176 grams of O₂ according to the following equation, how many grams of Fe₂O₃ are produced?

36) _____



Answer: 160

Answer Key

Testname: EXAM 2 B

- 1) E
- 2) C
- 3) A
- 4) A
- 5) B
- 6) B
- 7) B
- 8) E
- 9) E
- 10) A
- 11) D
- 12) B
- 13) C
- 14) E
- 15) D
- 16) E
- 17) C
- 18) B
- 19) A
- 20) A
- 21) A
- 22) D
- 23) D
- 24) A
- 25) 70.7
- 26) 5, 1
- 27) Pb
- 28) solid / precipitate
- 29) -1676
- 30) 29
- 31) 4.32
- 32) 571.6
- 33) K_3PO_4
- 34) Something that increases the concentration of OH^- ions.
- 35) Yes, No, No
- 36) 160