Honors Chemistry
Final Exam 2020
Dooner/Carmel High

INSTRUCTIONS: Place all answers only(A,B,C, etc) on a single piece of paper and email back to me. Show all work on separate sheets of paper. This test is open book, open note, and open source and you can use any resources(including my reviews) that are linked to the Moodle. It is NOT collaborative and you cannot get any assistance from any person or computer application(google search, etc etc)

1. $\qquad$ A Chemist experimentally determined the boiling point of a substance to be $123.1^{\circ} \mathrm{C}$. The actual boiling point of the substance is $124.7^{\circ} \mathrm{C}$. Calculate the percent error.
A) $1.3 \%$;
B) $0.0128 \%$;
C) $13 \%$;
D) $77.9 \%$
2. $\qquad$ Convert $160^{\circ} \mathrm{C}$ to kelvins:
A) 113 K ;
B) 160 K ;
C) 433 K ; D) -113 K
3. $\qquad$ A copper penny has a mass of 6.2 g and a volume of $0.70 \mathrm{~cm}^{3}$. What is the density of copper?
A) $8.9 \mathrm{~g} / \mathrm{cm}^{3}$;
B) $0.11 \mathrm{~g} / \mathrm{cm}^{3}$;
C) $8.9 \mathrm{~cm}^{3} / \mathrm{g}$;
D) $0.11 \mathrm{~cm}^{3} / \mathrm{g}$
4. How many neutrons are in the following atom- silver-108:
A) 155 ; B) 216 ; C) 94 ; D) 61
5. $\qquad$ The following electron configuration represents which element- $1 s^{2} 2 s^{2} 2 p^{6} 3 s^{2} 3 p^{4}$ :
A) Berrylium; B) sulfur; C) aluminum; D) argon
6. $\qquad$ Calculate the wavelength of yellow light emitted by a sodium lamp if the frequency of the radiation is $5.50 \times 10^{14} \mathrm{~Hz}$.
A) $5.45 \times 10^{-7} \mathrm{~m}$;
B) $1.83 \times 10^{-6} \mathrm{~m}$;
C) $1.83 \times 10^{-7} \mathrm{~m}$;
D) $1.83 \times 10^{-5} \mathrm{~m}$
7. $\qquad$ As you move from left to right across a period in the Periodic table, the size of atoms:
A) Stays the same; B) increases; C) decreases
8. $\qquad$ What is the symbol for the ion which is formed when copper loses two electrons?
A) $\mathrm{Cu}^{2-}$; B) $\mathrm{Cu}^{2+}$; C) ${ }^{2+} \mathrm{Cu}$; D) ${ }^{2-} \mathrm{Cu}$
9. $\qquad$ In the Lewis dot structure for a chlorine atom, how many dots would be placed around the symbol for chlorine:
A) One; B) two; C) five; D) seven
10. $\qquad$ Which of the following is the correct formula for lithium nitride?
A) LiN ; B) $\mathrm{LiNO}_{3}$; C) $\mathrm{Li}_{3} \mathrm{~N}$; D) $\mathrm{LiN}_{3}$
11. $\qquad$ What is the correct name for $\mathrm{CBr}_{4}$ :
A) Carbonate bromate; B) Tetracarbon bromide; C) Quatrocarbon bromide; D) Carbon tetrabromide
12. $\qquad$ How many moles of magnesium is $1.45 \times 10^{23}$ atoms of magnesium?
A) 0.241 moles Mg ; B) 0.028 mol Mg ; C) 2.41 mol Mg ; D) 0.28 mol Mg
13. $\qquad$ What is the molar mass of $\mathrm{Ba}\left(\mathrm{NO}_{3}\right)_{2}$ ?
A) 261.3 g ; B) 245.3 g ; C) 229.3 g ; D) 208.3 g
14. $\qquad$ Calculate the mass, in grams, of 3.50 mol of iron(II) hydroxide.
A) 450.1 g ; B) 900.2 g ; C) 314.3 g ; D) 157.5 g
15. $\qquad$ Determine the volume, in liters, of $0.50 \mathrm{~mol} \mathrm{SO}_{2}$ gas at STP.
A) 32 L ; B) 128 L ; C) 11.2 L ; D) 44.8 L
16. $\qquad$ The density of a gaseous compound is found to be $1.564 \mathrm{~g} / \mathrm{L}$ at STP. What is the molar mass of the compound?
A) $35.0 \mathrm{~g} / \mathrm{mol}$; B) $14.3 \mathrm{~g} / \mathrm{mol}$; C) $14.3 \mathrm{~g} / \mathrm{L}$; D) $35.0 \mathrm{~g} / \mathrm{L}$
17. $\qquad$ Determine the percent composition of the following- $\mathrm{Fe}_{2} \mathrm{O}_{3}$ :
A) $30.1 \% \mathrm{O}, 69.9 \% \mathrm{Fe}$; ${ }^{2} 74.2 \% \mathrm{Fe}, 25.8 \% \mathrm{O}$; C) $69.9 \% \mathrm{Fe}, 30.1 \% \mathrm{O}$
18. $\qquad$ What is the empirical formula of the following compound which contains $40.0 \% \mathrm{C}, 6.7 \%$ H , and $53.3 \% \mathrm{O}$ ?
A) CHO ; B) $\mathrm{C}_{2} \mathrm{HO}$; C) $\mathrm{CHO}_{2}$; D) $\mathrm{CH}_{2} \mathrm{O}$
19. $\qquad$ In the balanced equation for the reaction of aluminum sulfate and calcium hydroxide to form aluminum hydroxide and calcium sulfate, what is the coefficient of the calcium sulfate?
A) One; B) two; C) three; D) four
20. $\qquad$ In the following single replacement reaction, what are the products:

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\mathrm{Fe}(\mathrm{~s})+\mathrm{Pb}\left(\mathrm{NO}_{3}\right)_{2}(\mathrm{aq}) \rightarrow \text { ? }
$$

A) No reaction; B) iron(II) nitrate and solid lead; C) iron(III) nitrate and solid lead
21. $\qquad$ When calcium bromide ( aq ) and silver nitrate $(\mathrm{aq})$ react in a double replacement reaction, which of the following occurs?
A) No precipitate is formed; B) the precipitate is calcium nitrate; C) the precipitate is silver bromide; calcium nitrate and silver bromide are both precipitates
22. $\qquad$ A combustion reaction always involves which of the following as a reactant:
A) Carbon dioxide; B) water vapor; C) oxygen; D) carbon dioxide and water vapor
23. $\qquad$ When you write the balanced net ionic equation for the following reaction, what is the product-- $\mathrm{Na}_{3} \mathrm{PO}_{4}(\mathrm{aq})+\mathrm{FeCl}_{3}(\mathrm{aq}) \rightarrow \mathrm{NaCl}(\mathrm{aq})+\mathrm{FePO}_{4}(\mathrm{~s})$
A) $\mathrm{Na}^{+}(\mathrm{aq})$; B) $\mathrm{Na}^{+}(\mathrm{aq})+\mathrm{Cl}^{-}(\mathrm{aq})$; C) $\mathrm{Fe}^{3+}(\mathrm{aq})+\mathrm{PO}_{4}{ }^{3-}(\mathrm{aq})$; D) $\mathrm{FePO}_{4}(\mathrm{~s})$
24. $\qquad$ $\operatorname{Rust}\left(\mathrm{Fe}_{2} \mathrm{O}_{3}\right)$ is produced when iron $(\mathrm{Fe})$ reacts with oxygen $\left(\mathrm{O}_{2}\right)$ :

$$
4 \mathrm{Fe}(\mathrm{~s})+3 \mathrm{O}_{2}(\mathrm{~g}) \rightarrow 2 \mathrm{Fe}_{2} \mathrm{O}_{3}(\mathrm{~s})
$$

How many grams of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ are produced when 12.0 g of iron rusts?
A) 6 grams; B) 12 grams; C) 17.2 grams; D) 24 grams
25. $\qquad$ What pressure, in kilopascals, does a gas exert at 485 mm Hg :
A) 3657 kPa B) 64.6 kPa ; C) 49131 kPa ; D) 0.133 kPa
26. $\qquad$ A gas at 175 kPa and $25^{\circ} \mathrm{C}$ has an initial volume of 1.50 L . The pressure of the gas increases to 611 kPa as the temperature is raised to $131^{\circ} \mathrm{C}$. What is the new volume?
A) 0.582 L ; B) 2.25 L ; C) 5.82 L ; D) 0.225 L
27. $\qquad$ The solubility of a gas in water is $0.28 \mathrm{~g} / \mathrm{L}$ at 108 kPa . What is the solubility when the pressure of the gas is increased to 298 kPa ? Assume the temperature remains constant.
A) $0.10 \mathrm{~g} / \mathrm{L}$; B) $1.00 \mathrm{~g} / \mathrm{L}$; C) $7.7 \mathrm{~g} / \mathrm{L}$; D) $0.77 \mathrm{~g} / \mathrm{L}$
28. $\qquad$ A solution has a volume of 350 mL and contains 0.60 mol NaCl . What is its molarity?
A) 1.7 M ; B) 0.0017 M ; C) 0.58 M ; D) 583 M
29. $\qquad$ The temperature of a 95.4 gram piece of copper increases from $25^{\circ} \mathrm{C}$ to $48^{\circ} \mathrm{C}$ when the copper absorbs 849 J of heat. What is the specific heat of copper?
A) $3.87 \mathrm{~J} / \mathrm{g}^{\circ} \mathrm{C}$; B) $38.7 \mathrm{~J} / \mathrm{g}^{\circ} \mathrm{C}$; C) $0.387 \mathrm{~J} / \mathrm{g}^{\circ} \mathrm{C}$; D) $0.039 \mathrm{~J} / \mathrm{g}^{\circ} \mathrm{C}$
30. $\qquad$ How is the equilibrium position of this reaction affected by the following change:
REMOVING HYDROGEN
$\mathrm{C}(\mathrm{s})+\mathrm{H}_{2} \mathrm{O}(\mathrm{g})+$ heat $\leftrightarrow \mathrm{CO}(\mathrm{g})+\mathrm{H}_{2}(\mathrm{~g})$
A) Favors products; B) favors reactants; C) no effect
31. $\qquad$ The following reaction reaches equilibrium in a flask:
$\mathrm{H}_{2}(\mathrm{~g})+\mathrm{CO}_{2}(\mathrm{~g}) \leftrightarrow \mathrm{H}_{2} \mathrm{O}(\mathrm{g})+\mathrm{CO}(\mathrm{g})$
Analysis of the mixture gives the following results: $\mathrm{H}_{2}=0.053 \mathrm{M}, \mathrm{CO}_{2}=0.053 \mathrm{M}, \mathrm{H}_{2} \mathrm{O}=0.047 \mathrm{M}$, and $\mathrm{CO}=0.047 \mathrm{M}$. Calculate $\mathrm{K}_{\mathrm{eq}}$ for the reaction.
A) 0.79 ; B) 0.0079 ; C) 7.9 ; D) 79.0
32. $\qquad$ Find the pH of a solution where $\left[\mathrm{H}^{+}\right]=0.0015 \mathrm{M}$
A) 2.82 ; B) 2 ; C) 1.5 ; D) 4.5
33. $\qquad$ In the following reaction, identify the reducing agent $2 \mathrm{Na}(\mathrm{s})+\mathrm{S}(\mathrm{s}) \rightarrow \mathrm{Na}_{2} \mathrm{~S}(\mathrm{~s})$
A) Sulfur is the reducing agent; B) sodium is the reducing agent; C) sodium sulfide is the reducing agent
34. $\qquad$ Complete the following nuclear reaction equation

TEXTBOOK: \# 49a on page 822
35. $\qquad$ Manganese-56 is a beta emitter with a half-life of 2.60 hours. What is the mass of manganese- 56 in a 2.00 mg sample at the end of 10.4 hours?
A) 0.063 mg ; B) 6.3 mg ; C) 63 mg ; D) 0.125 mg

