SC2 – O'Malley SAT II Review (Stoichiometry)

For questions 1 – 3:

a. N_2O_5
b. N_2O_3
c. NO_2
d. NO
e. N_2O

1. What is the empirical formula for a compound containing 63.8% N and 36.2% O?

2. What is the empirical formula for a compound containing 36.7% N and 63.3% O?

3. What is the empirical formula for a compound containing 25.9% N and 74.1% O?

For questions 4 – 6:

a. 2.294
b. 36.51
c. 1.409
d. 25.3
e. 2.513

4. For $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$, if you begin with 16.00 g ammonia and excess oxygen, how many grams of water will be obtained?

5. For $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$, if you begin with 66.00 g ammonia and 54.00 g oxygen, how many grams of water will be obtained?

6. For $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$, how many moles of NH_3 are needed to produce 2.513 moles of NO?

For questions 7 – 10:

a. 1.807×10^{-24}
b. 3.476×10^{-2}
c. 1.171×10^{-2}
d. 1.204×10^{24}
e. 2.414×10^{-1}

7. How many phosphine molecules are in two moles of phosphine?

8. How many moles of CO_2 are in 1.53 g CO_2?

9. How many atoms are in one mole of water?

10. How many moles are in 4.35 grams of water?

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11. When the following is balanced, $C_4H_{10} + O_2 \rightarrow CO_2 + H_2O$, what is the coefficient of CO_2?

a. 2
b. 4
c. 8
d. 10
e. 13

12. What is the approximate percentage composition by mass of the element oxygen in the compound $HClO_4$?

a. 16%
b. 35%
c. 50%
d. 64%
e. 75%

13. When the following equation is balanced, how many moles of NF_3 would be required to react completely with 6 moles of H_2O?
$\_\_\_NF_3(g) + \_\_\_H_2O(g) \rightarrow \_\_\_HF(g) + \_\_\_NO(g) + \_\_\_NO_2(g)$

a. 0.5 mole
b. 1 mole
c. 2 moles
d. 3 moles
e. 4 moles

14. For the following equation, $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$, when 3.0 mol Fe_2O_3 is allowed to completely react with 56 g CO, approximately how many moles of iron, Fe, are produced?

a. 0.7
b. 1.3
c. 2.0
d. 2.7
e. 6.0

15. What is the percent by mass of silicon in a sample of SiO_2?

a. 21%
b. 33%
c. 47%
d. 54%
e. 78%

16. When the following equation is balanced, $\_\_\_PH_3 + \_\_\_O_2 \rightarrow \_\_\_P_2O_5 + \_\_\_H_2O$, what is the coefficient of H_2O?

a. 1
b. 2
c. 3
d. 4
e. 5

17. What are the products of the following reaction? $H_2SO_4(aq) + Ba(OH)_2(aq) \rightarrow$

a. O_2
b. $BaSO_4$
c. O_2 and $BaSO_4$
d. O_2 and $BaSO_4$
e. H_2O and $BaSO_4$

18. For the equation, $2Mg(s) + O_2(g) \rightarrow 2MgO(s)$, if 48.6 g Mg is placed in a container with 64.0 g O_2 and the reaction is allowed to go to completion, what is the mass of MgO(s) produced?

a. 15.4 g
b. 32.0 g
c. 80.6 g
d. 96.3 g
e. 112 g

19. For the equation, $2NO(g) + 2H_2(g) \rightarrow N_2(g) + 2H_2O(g)$, which of the following is true?

a. If 1 mole of H_2 is consumed, 0.5 moles of N_2 is produced
b. If 1 mole of H_2 is consumed, 0.5 mole of H_2O is produced
c. If 0.5 mole of H_2 is consumed, 1 moles of N_2 is produced
d. If 0.5 mole of H_2 is consumed, 1 moles of NO is produced
e. If 0.5 mole of H_2 is consumed, 1 moles of H_2O is produced

20. Which of the following expressions is equal to the number of iron (Fe) atoms present in 10.0 g Fe? (atomic mass of Fe = 55.9)

a. $10 \times 55.9 \times (6.022 \times 10^{23})$ atoms
b. $(6.022 \times 10^{23}) / 10 \times 55.9$ atoms
c. $10 \times (6.022 \times 10^{23}) / 55.9$ atoms
d. $55.9 / 10 \times (6.022 \times 10^{23})$ atoms
e. $10 / (55.9 \times 6.022 \times 10^{23})$ atoms

21. The formula $Cr(NH_3)_5SO_4Br$ represents

a. 4 atoms
b. 8 atoms
c. 12 atoms
d. 23 atoms
e. 27 atoms

22. What is the molecular formula of a compound made of 25.9% N and 74.1% O?

a. NO
b. NO_2
c. N_2O
d. N_2O_5
e. N_2O_4

23. The balanced molar relationship from the reaction $H_2O_2 \rightarrow H_2O + O_2$ is

a. 1:1:1
b. 2:1:1
c. 1:2:1
d. 2:2:1
e. 2:1:2

24. What volume of H_2O is required to produce 5 L O_2 by the following equation: $H_2O(g) \rightarrow H_2(g) + O_2(g)$

a. 3 L
b. 5 L
c. 10 L
d. 16 L
e. 14 L

25. What is the molecular weight of $HClO_4$?

a. 52.5
b. 73.5
c. 96.5
d. 100.5
e. 116.5

26. Which of the following molecules contains 17 atoms?
a. $Al_2(SO_4)_3$
b. $Al(NO_3)_3$
c. $Ca(HCO_2)_2$
d. $Mg(IO_3)_2$
e. Two of the above

27. Twenty liters of NO gas react with excess oxygen. How many liters of NO_2 gas are produced if the NO gas reacts completely? ($2NO + O_2 \rightarrow 2NO_2$)
a. 5 L
b. 10 L
c. 20 L
d. 40 L
e. 50 L

28. How much reactant remains if 92 g HNO_3 reacts with 24 g LiOH assuming a complete reaction?
a. 46 g HNO_3
b. 29 g HNO_3
c. 12 g HNO_3
d. 2 g LiOH
e. 12 g LiOH

29. What is the density, at STP, of a diatomic gas whose gram-formula mass is 80. g/mol?
a. 1.9 g/L
b. 2.8 g/L
c. 3.6 g/L
d. 4.3 g/L
e. 5.0 g/L

30. How many liters of H_2 can be produced at STP by the decomposition of 3 mol NH_3?
a. 4.5 L
b. 27 L
c. 67.2 L
d. 96 L
e. 101 L

31. How many mol CO_2 molecules are represented by 1.8×10^{24} atoms?
a. 1
b. 2
c. 3
d. 4
e. 5

32. How many grams of Na_2SO_4 can be produced by reacting 98 g H_2SO_4 with 40 g NaOH?
a. 18 g
b. 36 g
c. 71 g
d. 142 g
e. 150 g

33. What are the missing products of the following reaction? $NH_4Cl + Ca(OH)_2 \rightarrow$ _____ + $CaCl_2$
a. N_2
b. NH_3
c. H_2O
d. $NH_3 + N_2$
e. $NH_3 + H_2O$

34. How many grams of water can be produced when 8 g of hydrogen react with 8 g oxygen?
a. 8 g
b. 9 g
c. 18 g
d. 27 g
e. 30 g

35. How many atoms are represented in $Na_2CO_3 \cdot 10H_2O$
a. 4
b. 16
c. 36
d. 60
e. 96

36. What is the density of bromine vapor at STP?
a. 2.5 g/L
b. 2.9 g/L
c. 3.6 g/L
d. 4.9 g/L
e. 7.1 g/L

37. Fill in the missing reactant: $NaOH +$ _____ $\rightarrow NaClO_2 + H_2O$
a. Cl_2
b. HCl
c. HClO
d. $HClO_2$
e. $HClO_3$

38. How many grams of Na are present in 30 g NaOH?
a. 10 g
b. 15 g
c. 17 g
d. 20 g
e. 22 g

39. What is the sum of the coefficients when the following reaction is balanced? $\_\_\_C_6H_6 + \_\_\_O_2 \rightarrow \_\_\_CO_2 + \_\_\_H_2O$?
a. 7
b. 14
c. 28
d. 35
e. 42

40. How many atoms are represented by the following formula? $K_3Fe(CN)_6$
a. 6
b. 10
c. 16
d. 20
e. 18

41. Twenty-two grams of CO_2 at STP is identical to
a. 1 mole of CO_2
b. 6.022×10^{23} atoms
c. 6.022×10^{23} molecules
d. 11.2 liters
e. 22.4 liters

42. What volume does 8.5 g NH_3 occupy at STP?
a. 2.81 L
b. 5.61 L
c. 11.21 L
d. 22.41 L
e. 44.81 L

43. What is the formula of a hydrocarbon composed of 86% carbon and 14% hydrogen by weight?
a. CH_4
b. C_2H_4
c. C_2H_6
d. C_3H_8
e. C_4H_6

44. How many grams of CO_2 are produced by the complete reaction of 100 g $CaCO_3$ with excess HCl?
a. 22 g
b. 44 g
c. 79 g
d. 110 g
e. 132 g

45. 28 mL of nitrogen are reacted with 15 mL of hydrogen. How many milliliters of which gas are left unreacted?
a. 5 mL H_2
b. 5 mL N_2
c. 7 mL H_2
d. 11 mL N_2
e. 23 mL N_2

46. If 28 mL of nitrogen are reacted with 15 mL of hydrogen, what is the total volume of gas present after the reaction has occurred, assuming volumes are additive?
a. 11 mL
b. 17 mL
c. 27 mL
d. 33 mL
e. 42 mL

47. What is the mass of 1 L of a gas at STP whose molar mass is 254 g/mol?
a. 11.3 g
b. 25.4 g
c. 30.6 g
d. 76.5 g
e. 254 g

1.	E
2.	B
3.	A
4.	D
5.	B
6.	E
7.	D
8.	B
9.	A
10.	E
11.	C
12.	D
13.	E
14.	B
15.	C
16.	C
17.	E
18.	C
19.	A
20.	C
21.	E
22.	D
23.	D
24.	C
25.	D
26.	A
27.	C
28.	B
29.	C
30.	E
31.	A
32.	C
33.	E
34.	B
35.	C
36.	E
37.	D
38.	C
39.	D
40.	C
41.	D
42.	C
43.	B
44.	B
45.	E
46.	D
47.	A