



Name: \_\_\_\_\_

## Stoichiometry Test 3.1

### Multiple Choice

- \_\_\_ 1. The molecular weight (also known as the formula weight) is (1) the sum of the atomic numbers of all of the atoms in a molecule or formula unit; (2) the sum of the atomic weights of all of the atoms in a molecule or formula unit; (3) both 1 and 2 since atomic numbers and atomic weights are the same; (4) none of the above.
- \_\_\_ 2. One of the properties associated with hydrates is: (1) water is loosely attached; (2) water is tightly attached; (3) ammonia is attached to a molecule of salt; (4) none of the above; (5) all of the above.
- \_\_\_ 3. Balancing a formula equation is achieved by (1) setting the coefficients equal to one and adjusting subscripts in the formulas; (2) adjusting the coefficients to the smallest possible whole number ratio; (3) adjusting the number of elements produced; (4) adjusting the formula of a compound.
- \_\_\_ 4. Which of the following enthalpy values would indicate an endothermic reaction? (1) -62.5 kcal; (2) 62.5 kcal; (3) -62 kcal; (4) 62 kcal; (5) both (1) and (3); (1,2) both (2) and (4).
- \_\_\_ 5. The formula weight of copper (I) sulfate is (1) 160; (2) 80; (3) 144; (4) 224.
- \_\_\_ 6. The molecular weight of resveratrol,  $C_{14}H_{14}O_3$ , a compound found in wine and may provide cardio-vascular health, is (1) 96; (2) 342; (3) 115; (4) 230.; (5) none of the above.
- \_\_\_ 7. How many grams would be in 0.2 mols of iron (II) oxide? (1) 7.2; (2) 72; (3) 14.4; (4) 160; (5) 32; (1,2) 3.2; (1,3) none of the above is within 10% of the answer if the atomic weights are rounded to the nearest integer.
- \_\_\_ 8. What is the percentage of iron in iron (II) oxide? (1) 56; (2) 112; (3) 70; (4) 78; (5) none of the above is within 10% of the answer if the atomic weights are rounded to the nearest integer.
- \_\_\_ 9. When the equation:  $Cu_2O + CH_4 \rightarrow H_2O + Cu + CO_2$  is correctly balanced the coefficient in front of the formula for copper (I) oxide is (1) 1; (2) 2; (3) 3; (4) 4; (5) none of the above.
- \_\_\_ 10. How many mols of methane are required to produce one mol of copper by the reaction given in question 9? (1) 0.5 mols; (2) 1.0 mols; (3) 1.5 mols; (4) 0.25 mols; (5) 0.125; (1,2) none of the above.
- \_\_\_ 11. According to the Star Trek manual the element Rodinium (Ro), atomic number 125,

was first discovered on Vega IX. According to the quantum theory this element should form Rodinium (V) oxide,  $\text{Ro}_2\text{O}_5$ . If this compound is found to be 89.0 % Ro, what would its atomic weight be? (1) 324; (2) 2373; (3) 570; (4) 712; (5) 1424; (1,2) 317.

- \_\_\_ 12. Saccharin, an artificial sweetener which is 3000 times sweeter than sucrose, is composed of 45.90% carbon, 2.73% hydrogen, 26.23% oxygen, 7.65% nitrogen, and 17.49% sulfur. Its molecular weight is 183. What is the molecular formula of saccharin? (1)  $\text{C}_{14}\text{H}_{10}\text{O}_6\text{N}_2\text{S}_2$ ; (2)  $\text{C}_3\text{H}_7\text{O}_3\text{NS}$ ; (3)  $\text{C}_8\text{H}_9\text{O}_2\text{NS}$ ; (4)  $\text{C}_7\text{H}_5\text{O}_3\text{NS}$ .
- \_\_\_ 13. After a successful ride on a bronco Sally Samarium said "I Rh". Later that day she discovered Pyrargyrite, an ore of silver, on her land. Pyrargyrite has the formula  $\text{Ag}_6\text{Sb}_2\text{S}_6$ . What is the percentage of silver in this ore? (1) 17.8; (2) 22.5; (3) 42.9; (4) 14.3; (5) 59.8.
- \_\_\_ 14. For each ton (2000 lbs=908 kG) of land that Sally mines in question 13, 5 % of it is Pyrargyrite on the average. How much silver can be extracted from one ton of Sally's land? (1) 8,080 G; (2) 10,220 G; (3) 19,480 G; (4) 6,500 G; (5) 27,100 G.
- \_\_\_ 15. How much money would Sally make per ton of land, if the price of silver is \$3.00 per gram? (1) \$81,400; (2) \$20,000; (3) \$58,000; (4) \$31,000; (5) \$24,000.

Questions 16-20 pertain the following problem. **All numerical answers in this group of problems must be reported to the proper number of significant digits.**

A sample containing gold (III) cyanide and an inert material was to be analyzed for gold by reacting the gold (III) cyanide in the sample with sodium bromide and massing the amount of gold (III) bromide produced. The following data was collected.

mass of the empty 150 mL beaker ----- 100.000 g.

mass of the 150 mL beaker plus the sample ----- 110.000 g.

mass of the empty filter paper ----- 1.000 g.

mass of the filter paper plus gold (III) bromide ----- 8.939 g.

- \_\_\_ 16. Which of the following describes the unbalanced reaction?
- (1)  $\text{Au}(\text{CN})_3 + \text{NaBr} \longrightarrow \text{AuBr}_3 + \text{NaCN}$
- (2)  $\text{AuCN} + \text{NaBr} \longrightarrow \text{AuBr} + \text{NaCN}$
- (3)  $\text{Au}(\text{CN})_2 + \text{NaBr} \longrightarrow \text{AuBr}_2 + \text{NaCN}$
- (4)  $\text{Au}(\text{SCN})_3 + \text{NaCN} \longrightarrow \text{AuBr} + \text{NaSCN}$
- (5)  $\text{AuSCN} + \text{NaCN} \longrightarrow \text{AuBr} + \text{NaSCN}$
- (1,2)  $\text{AuBr}_3 + \text{NaCN} \longrightarrow \text{Au}(\text{CN})_3 + \text{NaBr}$
- (1,3)  $\text{AuBr} + \text{NaCN} \longrightarrow \text{AuCN} + \text{NaBr}$
- (1,4) none of the above

- \_\_\_ 17. The mass of gold (III) bromide produce in this analysis is (1) 8.939 G; (2) 7.939 G; (3) 1.000 G; (4) 10.000 G; (5) 9.000 G; (1,2) 8.94 G; (1,3) 7.94 G; (1,4) 1.0 G; (1,5) none of the above.
- \_\_\_ 18. The mols of gold (III) bromide collected in this analysis is (1) 0.007779; (2) 0.003211;

(3) 0.0019449; (4) 0.054542; (5) 0.05454; (1,2) 0.01818; (1,3) 0.018181.

- \_\_\_ 19. The mass (in grams) of gold (III) cyanide that had to be present in the sample is (1) 5 G; (2) 5.0 G; (3) 5.00; (4) 5.000; (5) 5.0000; (1,2) 10.000; (1,3) none of the above.
- \_\_\_ 20. The percentage of gold (III) cyanide that was present in the sample was (1) 50; (2) 50.0; (3) 50.00; (4) 50.000; (5) 50.001; (1,2) 50.01; (1,3) 50.1.

### Short Answer

1. Zeaxanthin is one of the compounds found to cause the colors in maple leaves in the fall. It has a molecular weight of 544 and is 83.82% carbon, 10.29% hydrogen, and 5.88% oxygen. Find the molecular formula of zeaxanthin.

2. Copper can be extracted from copper (II) oxide by reduction with methane. The unbalanced reaction is:  $\text{CuO} + \text{CH}_4 \rightarrow \text{Cu} + \text{CO}_2 + \text{H}_2\text{O}$ . Calculate the amount of copper that can be produced from 100.0 G of Copper (II) oxide. [Note: two points extra credit will be given for an answer calculated and reported to the proper number of significant digits.]

### Extra Credit

1. What did Sally say in question 13?
2. What is  $\text{BaNa}_2\text{S}$ ?