

# CH 121

## General and Inorganic Chemistry Exam 1 May 20, 2002

### KEY

Name: \_\_\_\_\_  
(please print)

SSN: \* \* \* - \* \* - \_\_\_\_\_  
(last 4 digits)

Each question is worth 1 point.

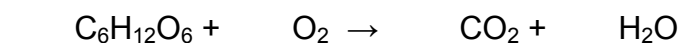
Circle your answer clearly, otherwise no credit will be given.

Circle only one answer. If you circle two or more, you will receive no credit.

1. In the gaseous state, particles
  - a. move independently and randomly.
2. A student does a calculation using her calculator and the number 280.27163 is shown on the display. If there are actually three significant figures, how should she show the final answer?
  - e.  $2.80 \times 10^2$
3. About 1910 Rutherford and colleagues performed experiments by targeting a stream of alpha particles at a piece of gold foil and recording the deflection of the particles on a sensitive screen. Which of the following statement(s) were conclusion(s) that were drawn from those experiments?
  1. Most of the volume of the atom is empty space.
  2. The nucleus of an atom is extremely dense.
  3. Electrons are negatively charged.
  - c. 1 and 2 only
4. Copper has two stable isotopes,  $^{63}\text{Cu}$  and  $^{65}\text{Cu}$ . How many protons, electrons, and neutrons does an atom of  $^{65}\text{Cu}$  contain?
 

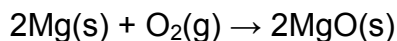
<u>Protons</u>	<u>Electrons</u>	<u>Neutrons</u>
c. 29	29	36
5. Which of the following is **NOT** an element of the fourth period in the periodic table?
  - c. Mg
6. Three elements in the lanthanide series are
  - b. Ce, Nd, Sm
7. A sample of 1.00 g of lead contains \_\_\_\_\_ atoms.
  - e.  $2.91 \times 10^{21}$
8. What is an expression for calculating the average mass of **one** atom of argon?
  - c.  $39.9 \text{ g} / 6.02 \times 10^{23} \text{ atoms}$
9. In 0.250 moles of ethylene glycol (antifreeze),  $\text{HOCH}_2\text{CH}_2\text{OH}$ , there are
  - c.  $1.51 \times 10^{24}$  atoms.
10. How many moles of  $\text{SO}_2$  are in  $1.07 \times 10^{23}$  molecules of  $\text{SO}_2$ ?
  - b. 0.178 mol
11. Which of the following contains the largest number of molecules: 6.00 g  $\text{CH}_4$ , 9.00 g  $\text{H}_2\text{O}$ , 15.0 g  $\text{NO}_2$ , 11.0 g  $\text{C}_2\text{H}_6$ , or 20.0 g  $\text{C}_2\text{H}_5\text{OH}$ ?
  - b.  $\text{H}_2\text{O}$

12. Which of the following series represents only known stable metal ions?  
d.  $\text{Fe}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Mg}^{2+}$
13. The following species  $\text{F}^-$ ,  $\text{Ne}$ ,  $\text{Na}^+$ , and  $\text{Mg}^{2+}$  all have the same number of  
c. electrons.
14. Which group of compounds are ALL ionic?  
c.  $\text{CaCl}_2$ ,  $\text{FeCl}_3$ ,  $\text{NaCl}$
15. When glucose undergoes complete combustion, the products are carbon dioxide and water.



When the equation above is properly balanced with the smallest whole numbers, the respective coefficients are:

- b. 1, 6, 6, 6
16. The balanced equation for the reaction of lithium with oxygen is  
a.  $4\text{Li}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{Li}_2\text{O}(\text{s})$
17. Aluminum reacts with oxygen to give aluminum(III) oxide.  
$$4\text{Al}(\text{s}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{Al}_2\text{O}_3(\text{s})$$
  
If you have 6.0 moles of Al,  
d. you need 4.5 moles of  $\text{O}_2$  for complete reaction and produce 3.0 moles of  $\text{Al}_2\text{O}_3$ .
18. How many grams of carbon are needed to react completely with 75.2 grams of  $\text{SiO}_2$  according to the following equation?  
$$\text{SiO}_2(\text{s}) + 3\text{C}(\text{s}) \rightarrow \text{SiC}(\text{s}) + 2\text{CO}(\text{g})$$
  
d. 45.1 g
19. The compound  $\text{P}_4\text{S}_3$  is used in matches and its reaction with oxygen is  
$$\text{P}_4\text{S}_3(\text{s}) + 8\text{O}_2(\text{g}) \rightarrow \text{P}_4\text{O}_{10}(\text{s}) + 3\text{SO}_2(\text{g})$$
  
How many grams of  $\text{O}_2$  are needed to react with 0.450 grams of  $\text{P}_4\text{S}_3$ ? (Molar mass of  $\text{P}_4\text{S}_3$  is 220.1 g/mol.)  
c. 0.523 g
20. How many moles of magnesium (if any) remain when 5.00 grams of magnesium is burned in 2.50 grams of pure oxygen?



- d. 0.0498 mol