

CHEMISTRY 150, FIRST PRACTICE EXAM

NO WORK, NO CREDIT. The right answer is not right if the correct work is not shown.

1. (4) Which statement about isotopes of an element is **false**?
 - a. They have the same atomic number.
 - b. They have the same number of neutrons.
 - c. They have the same number of electrons.
 - d. They have the same elemental symbol.

2. (6) Determine the following for the $^{59}\text{Ni}^{2+}$ ion.
 - a. Mass number _____
 - b. Number of neutrons _____
 - c. Number of electrons _____

3. (3) For a large collection of sulfur (S) atoms, what is the mass of an average S atom in (in amu)?

(4) What is the mass of this average S atom in grams?

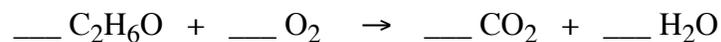
4. (4) What is the mass in grams of 12.044×10^{23} nitrogen atoms?

5. (4) You have 0.125 mole of each of the following elements: K, Al, C, and Cu. Which sample has the **smallest** mass?
 - a. K
 - b. Al
 - c. C
 - d. Cu

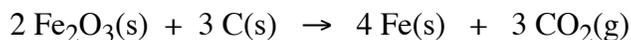
6. (5) One mole of aluminum sulfate, $\text{Al}_2(\text{SO}_4)_3$, has a mass of
 - a. 123.05 g
 - b. 342.16 g
 - c. 450.08 g
 - d. 1206.73 g

7. (6) Citric acid, $\text{C}_6\text{H}_8\text{O}_7$, is found in many fruits. How many C atoms are contained in 0.200 g of the acid?
 - a. 1.04×10^{20} atoms
 - b. 6.27×10^{20} atoms
 - c. 3.76×10^{21} atoms
 - d. 6.02×10^{23} atoms

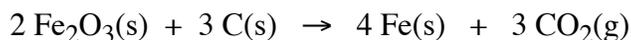
8. (3) Balance the equation.



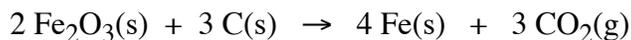
9. (4) According to the following reaction, how many moles of iron(III)oxide, Fe_2O_3 , are needed to fully react with 5.0 moles of carbon?



- a. 3.3 mol
b. 5.0 mol
c. 7.5 mol
d. 1.0×10^1 mol
10. (4) According to the following reaction, how many grams of CO_2 are produced if 0.354 moles of Fe are also produced?



- a. 15.6 g
b. 11.7 g
c. 3.89 g
d. 1.42 g
11. (4) According to the following reaction, how many grams of Fe_2O_3 are required to produce 6.99 g of Fe?



- a. 40.0 g
b. 20.0 g
c. 11.3 g
d. 9.99 g

12. (15) According to the following reaction, how many grams of iron are produced when 10.5 g of iron(III)oxide and 2.00 g of carbon react?



- a. 12.4 g
b. 7.34 g
c. 4.13 g
d. 1.36 g
13. (5) The excess reagent in question #12 is _____ and _____ g of it is left over.
14. (4) What would happen to the amount of Fe produced in question #12 if the amount of carbon is tripled?
- a. It would increase by a factor of three.
b. It would increase by a factor of less than three.
c. It would increase by a factor of more than three.
d. It would stay the same.
15. (3) Determine the percent sulfur present in CuSO_4 .
- _____ % S

16. (7) A compound contains 49.4% K, 20.3% S, and the remainder oxygen. Determine its empirical formula.

17. (3) Maleic acid, which is used to manufacture artificial resins, has the empirical formula CHO. Its molar mass is 116.1 g/mol. What is its molecular formula?

- a. CHO b. C₂H₂O₂
c. C₃H₃O₃ d. C₄H₄O₄

18. (4) In general, the potential energy, V, between two charged particles

- a. is always positive. b. is always negative.
c. has a sign that depends on the charge of the particles.

19. (4) Circle or fill in the correct choice for the blanks.

As the distance between a nucleus and an electron decreases, the potential energy of the electron becomes a _____ (smaller, larger) _____ (positive, negative) value.

20. (4) Which hypothetical atom will have the same ionization energy as an atom with one proton and one electron at a distance of 500 pm from the proton?

- a. An atom with one proton and one electron at a distance of 1000 pm.
b. An atom with two protons and one electron at a distance of 1000 pm.
c. An atom with one proton and one electron at a distance of 250 pm.
d. An atom with three protons and one electron at a distance of 400 pm.

Score _____/100