

## DR. ASHLEY'S TOP THIRTY QUESTIONS FOR TEST 1

*(NOTE: This is only one "study guide" you should use to prepare yourself for the test; there may be topics that we covered in class that are not represented by these questions!!).*

1. A naturally occurring element consists of **three** isotopes. The data on the isotopes:

isotope #1: 147.9554 **u**, 10.563%

isotope #2: 150.9496 **u**, 70.811%

isotope #3: 152.9461 **u**, 18.626%

What is the average atomic weight of this naturally occurring element?

- a. 50.335 **u**
- b. 150.62 **u**
- c. 150.67 **u**
- ! d. 151.01 **u**
- e. 151.08 **u**

2. Which one of the following contributes to the charge but does NOT contribute significantly to the mass of an atom?

- ! a. electrons
- b. nuclei
- c. photons
- d. neutrons
- e. protons

3. Which answer below best describes all atoms of a particular element?

- a. they possess the same number of electrons, the same atomic number, the same mass, but nothing else in common
- b. they possess the same mass and the same chemical properties, but nothing else in common
- ! c. they possess the same number of electrons, the same atomic number, the same chemical properties, but not necessarily the same mass
- d. they possess the same chemical properties and the same mass, but nothing else in common
- e. they possess the same atomic number and the same mass, but have nothing else in common

4. The species,  ${}_{23}^{51}\text{V}$ , has the same number of neutrons as

- a.  ${}_{23}^{50}\text{V}$
- b.  ${}_{21}^{45}\text{Sc}$
- c.  ${}_{25}^{55}\text{Mn}$
- ! d.  ${}_{24}^{52}\text{Cr}$
- e.  ${}_{27}^{59}\text{Co}$

5. Which description below fits the  ${}^{112}_{48}\text{Cd}^{2+}$  ion?
- a. 48 protons, 64 neutrons, 48 electrons
  - b. 48 protons, 62 neutrons, 48 electrons
  - ! c. 48 protons, 64 neutrons, 46 electrons
  - d. 48 protons, 62 neutrons, 46 electrons
  - e. 50 protons, 64 neutrons, 48 electrons
6. Naturally occurring indium consists of two isotopes  
 ${}^{113}\text{In}$ , 112.904061 u     ${}^{115}\text{In}$ , 114.903880 u  
The atomic weight of naturally occurring indium is listed in the Handbook as 114.818 u.  
From this data, calculate the percent of the  ${}^{115}\text{In}$  isotope in naturally occurring indium.  
\_\_\_\_\_ ( ! 95.705 or 95.706)
7. Which one of the following elements exists as a diatomic molecule when it is in the free state?
- a. C
  - b. P
  - c. S
  - ! d. Br
  - e. Ni
8. The number of atoms in one formula unit of the substance,  $\text{C}_2\text{H}_4(\text{COOH})_2$ , is
- a. 10
  - b. 11
  - c. 12
  - ! d. 14
  - e. 16
9. When the coefficients in the chemical equation,  $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ , are calculated after the equation is balanced so that the number of atoms of each kind on the reactant side equals the number of atoms of that kind on the product side, the sum of the smallest set of integer coefficients will be
- a. 11
  - b. 12
  - ! c. 13
  - d. 17
  - e. 19
10. What is the correct name for the compound  $\text{IBr}_3$ ?
- a. bromic iodide
  - b. iodine bromate
  - ! c. iodine tribromide
  - d. iodine tribromine
  - e. monoiodine tribromite

11. The correct formula for the compound formed between arsenic (As) and hydrogen is

- a. AsH
- b. As<sub>2</sub>H
- c. AsH<sub>2</sub>
- d. As<sub>3</sub>H
- ! e. AsH<sub>3</sub>

12. What is the correct name for the compound BaSeO<sub>3</sub>?

- a. barium selenate
- b. barium selenide
- ! c. barium selenite
- d. barium selenium trioxide
- e. barium selenoxate

13. The correct formula for the compound formed from calcium ion and acetate ion is

- a. CaC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>
- b. Ca<sub>2</sub>C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>
- c. Ca<sub>2</sub>(C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>)<sub>4</sub>
- ! d. Ca(C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>)<sub>2</sub>
- e. Ca(C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>)<sub>3</sub>

14. If the NtO<sub>4</sub><sup>2-</sup> ion is called nortonate, what is the correct name for the compound CsHNtO<sub>4</sub>?

- a. cesium monohydrogen nortonite
- b. cesium nortonic acid
- ! c. cesium monohydrogen nortonate
- d. cesium hydrogen nortonium tetraoxide
- e. based on the information given, this compound couldn't exist with the formula as

given

15. On a day in the summer of 1976, the temperature fell from 95 °F to 75 °F in just three hours. The temperature drop expressed in celsius degrees (C°) was

- ! a. 11 C°
- b. 13 C°
- c. 18 C°
- d. 20 C°
- e. -12 C°

16. When the expression,  $412.272 + 0.00031 - 1.00797 + 0.000024 + 12.8$ , is evaluated, the result should be expressed as

- a. 424
- b. 424.0
- ! c. 424.1
- d. 424.06
- e. 424.064364

17. When a student evaluates the expression

$$\frac{4.268 \times 0.082057 \times 373.15}{\frac{744.6}{760.0} \times 2.688}$$

the result should be expressed as

- a. 49.623
- b. 49.631
- ! c. 49.62
- d. 49.63
- e. 49.623202

18. The average distance from the earth to the sun is  $9.30 \times 10^7$  miles. Light travels at a speed of  $3.00 \times 10^8$  meters per second. If the sun were to be suddenly extinguished, how long would it take for the effect to be visible here on the earth?

- a. 8.32 seconds
- b. 5.38 minutes
- c. 0.499 seconds
- ! d. 8.32 minutes
- e. 0.310 seconds

19. How many square meters are there in a rectangular piece of carpet which measures 12.0 feet by 22.0 feet? 1 m = 39.37 in, 1 ft = 12 in.

- ! a.  $24.5 \text{ m}^2$
- b.  $28.4 \text{ m}^2$
- c.  $866 \text{ m}^2$
- d.  $80.5 \text{ m}^2$
- e.  $966 \text{ m}^2$

20. A pure sample of a mineral which contains magnesium has a density of  $4.05 \text{ g/cm}^3$ . Given that 1 foot(ft) = 12 inches(in), 1 in = 2.54 cm, and 1 pound (lb) = 453.6 g, what is the density of the mineral in  $\text{lb/ft}^3$ ?

- a.  $18.3 \text{ lb/ft}^3$
- b.  $146 \text{ lb/ft}^3$
- ! c.  $253 \text{ lb/ft}^3$
- d.  $272 \text{ lb/ft}^3$
- e.  $557 \text{ lb/ft}^3$

21. The metric equivalent of the popular 55 gallon drum has a volume of 0.200 cubic meters. One such drum was filled with a colorless liquid, Sukanol, which has a density of  $1.168 \text{ g cm}^{-3}$ . How many pounds should this quantity of Sukanol weigh? 1 pound (lb) = 453.6 g.
- a. 53.6 lb
  - ! b. 515 lb
  - c. 536 lb
  - d.  $5.16 \times 10^5$  lb
  - e. 1102 lb
22. The formula mass of  $\text{Co}(\text{NH}_3)_6(\text{ClO}_4)_3$  is
- a. 318.53 u
  - b. 389.43 u
  - c. 402.57 u
  - ! d. 459.47 u
  - e. 754.13 u
23. The atomic weight of cobalt is 58.994 u. How many moles of Co are there in a 7.61 g sample of cobalt?
- a. 0.106 moles
  - b. 0.114 moles
  - c. 0.123 moles
  - ! d. 0.129 moles
  - e.  $7.79 \times 10^{22}$  moles
24. How many moles of carbon atoms are combined with 11.2 moles of hydrogen atoms in a sample of the compound,  $\text{C}_3\text{H}_8$ ?
- a. 3.00
  - b. 5.60
  - ! c. 4.20
  - d.  $6.02 \times 10^{23}$
  - e. 29.9
- 25 What is the percent, by weight, of oxygen in  $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ ?
- a. 14.846
  - b. 39.875
  - c. 43.273
  - d. 49.531
  - ! e. 62.661

26. A compound contains sodium, boron, and oxygen. The experimental analysis gave values of 53.976 % sodium and 8.461 % boron, by weight, the remainder is oxygen. What is the empirical formula of the compound?

- a.  $\text{NaBO}_2$
- ! b.  $\text{Na}_3\text{BO}_3$
- c.  $\text{Na}_3\text{BO}_2$
- d.  $\text{NaB}_3\text{O}$
- e.  $\text{Na}_3\text{B}_3\text{O}_8$

27. A compound has an empirical formula  $\text{C}_2\text{H}_4\text{O}$ . An independent analysis gave a value of 132 for its molar mass. What is the correct molecular formula?

- a.  $\text{C}_4\text{H}_4\text{O}_5$
- b.  $\text{C}_{10}\text{H}_{12}$
- c.  $\text{C}_7\text{O}_3$
- ! d.  $\text{C}_6\text{H}_{12}\text{O}_3$
- e.  $\text{C}_4\text{H}_8\text{O}_5$

28. A sample of  $\text{C}_7\text{H}_5\text{N}_3\text{O}_4$ , contains 0.4662 moles of carbon atoms. How many nitrogen atoms are there in the sample?

- a.  $2.807 \times 10^{23}$  atoms
- ! b.  $1.203 \times 10^{23}$  atoms
- c.  $4.101 \times 10^{23}$  atoms
- d.  $1.998 \times 10^{22}$  atoms
- e.  $6.551 \times 10^{23}$  atoms

29. The atomic weight of cobalt is 58.994 u. What is the mass of a cobalt sample which contains 0.763 moles of cobalt?

- a. 39.7 g
- b. 40.3 g
- c. 43.4 g
- ! d. 45.0 g
- e. 45.7 g

30. How many atoms of oxygen are contained in 47.6 g of  $\text{Al}_2(\text{CO}_3)_3$ ? The molar mass of  $\text{Al}_2(\text{CO}_3)_3$  is 233.99 g/mol.

- A)  $1.23 \times 10^{23}$  O atoms
- B)  $2.96 \times 10^{24}$  O atoms
- C)  $2.87 \times 10^{25}$  O atoms
- ! D)  $1.10 \times 10^{24}$  O atoms
- E)  $3.19 \times 10^{24}$  O atoms