

Winter Break Packet

Name: _____

Date: _____

1. What is the total number of electrons in an atom with an atomic number of 13 and a mass number of 27?

- A. 13 B. 14 C. 27 D. 40

2. The first ionization energy, in kilocalories per mole of atoms, of astatine (At) would most likely be

- A. 162 B. 182 C. 222 D. 252

3. Which nucleus contains the greatest number of neutrons?

- A. ${}_{16}^{31}\text{S}$ B. ${}_{16}^{32}\text{S}$ C. ${}_{15}^{31}\text{P}$ D. ${}_{15}^{32}\text{P}$

4. The nucleus of an atom consists of 8 protons and 6 neutrons. The total number of electrons present in a neutral atom of this element is

- A. 6 B. 2 C. 8 D. 14

5. An element that has a high ionization energy and tends to be chemically inactive would most likely be

- A. an alkali metal
B. a transition element
C. a noble gas
D. a halogen

6. The mass of an electron is approximately $\frac{1}{1836}$ times the mass of

- A. ${}^1_1\text{H}$ B. ${}^2_1\text{H}$ C. ${}^3_1\text{H}$ D. ${}^4_2\text{He}$

7. What is the atomic number of an element whose atoms each contain 47 protons, 60 neutrons, and 47 electrons?

- A. 13 B. 47 C. 60 D. 107

8. Using the rules for significant figures, the sum of 0.027 gram and 0.0023 gram should be expressed as

- A. 0.029 gram B. 0.0293 gram
C. 0.03 gram D. 0.030 gram

9. In which two atoms do both nuclides contain the same number of neutrons?

- A. $^{20}_{10}\text{Ne}$ and $^{40}_{18}\text{Ar}$ B. $^{65}_{29}\text{Cu}$ and $^{65}_{30}\text{Zn}$
C. $^{24}_{12}\text{Mg}$ and $^{26}_{12}\text{Mg}$ D. $^{14}_6\text{C}$ and $^{16}_8\text{O}$

10. Which is the atomic number of an atom with six valence electrons?

- A. 6 B. 8 C. 10 D. 12

11. The temperature 30 K expressed in degrees Celsius is

- A. 243°C B. -243°C
C. 303°C D. -303°C

12. Which device should be used to accurately measure a volume of 16.30 milliliters?

A.



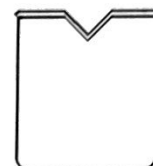
B.



C.



D.



13. Which atom has the strongest attraction for electrons?

- A. Cl B. F C. Br D. I

14. Which of the following elements has the *lowest* electronegativity?

- A. carbon B. fluorine
C. nitrogen D. oxygen

15. Which temperature represents absolute zero?
- A. 0 K B. 0°C
C. 273 K D. 273°C
16. What is the product of (2.324 cm × 1.11 cm) expressed to the correct number of significant figures?
- A. 2.58 cm² B. 2.5780 cm²
C. 2.5796 cm² D. 2.57964 cm²
17. Which measurement, contains a total of three significant figures?
- A. 0.012 g B. 0.125 g
C. 1,205 g D. 12,050 g
18. The nucleus of an atom of $^{127}_{53}\text{I}$ contains
- A. 53 neutrons and 127 protons
B. 53 protons and 127 neutrons
C. 53 protons and 74 neutrons
D. 53 protons and 74 electrons
19. In a laboratory exercise to determine the density of a substance, a student found the mass of the substance to be 6.00 grams and the volume to be 2.0 milliliters. Expressed to the correct number of significant figures, the density of the substance is
- A. 3.000 g/mL B. 3.00 g/mL
C. 3.0 g/mL D. 3 g/mL
20. An experiment using alpha particles to bombard a thin sheet of gold foil indicated that most of the volume of the atoms in the foil is taken up by
- A. electrons B. protons
C. neutrons D. empty space
21. An atom of $^{226}_{88}\text{Ra}$ contains
- A. 88 protons and 138 neutrons
B. 88 protons and 138 electrons
C. 88 electrons and 226 neutrons
D. 88 electrons and 226 protons
22. Which of the following atoms has the greatest nuclear charge?
- A. $^{14}_7\text{N}$ B. $^{12}_6\text{C}$ C. ^2_1H D. ^4_2He

23. Which conclusion is based on the "gold foil experiment" and the resulting model of the atom?

- A. An atom is mainly empty space, and the nucleus has a positive charge.
- B. An atom is mainly empty space, and the nucleus has a negative charge.
- C. An atom has hardly any empty space, and the nucleus has a positive charge.
- D. An atom has hardly any empty space, and the nucleus has a negative charge.

24. The number of protons in the nucleus of $^{32}_{15}\text{P}$ is

- A. 15 B. 17 C. 32 D. 47

25. Which quantity expresses the sum of the given masses to the correct number of significant figures.

$$\begin{array}{r} 22.1 \text{ g} \\ 375.66 \text{ g} \\ + 5400.132 \text{ g} \\ \hline \end{array}$$

- A. 5800 g B. 5798 g
C. 5797.9 g D. 5797.892 g

26. A student determined in the laboratory that one mole of KMnO_4 had a mass of 171.54 grams. The mass of one mole of KMnO_4 in an accepted chemistry reference is 158.04 grams. What is the percent error of the mass of one mole of KMnO_4 as determined by the student?

- A. 0.787% B. 7.87%
C. 8.54% D. 13.5%

27. Experimental evidence indicates that the nucleus of an atom

- A. contains most of the mass of the atom
B. contains a small percentage of the mass of the atom
C. has no charge
D. has a negative charge

28. Expressed to the correct number of significant figures, what is the correct sum of $(3.04 \text{ g} + 4.134 \text{ g} + 6.1 \text{ g})$?

- A. 13 g B. 13.3 g
C. 13.27 g D. 13.274 g

29. In an experiment, alpha particles were used to bombard gold foil. As a result of this experiment, the conclusion was made that the nucleus of an atom is

- A. smaller than the atom and positively charged
- B. smaller than the atom and negatively charged
- C. larger than the atom and positively charged
- D. larger than the atom and negatively charged

30. Which temperature is equal to 120. K?

- A. -153°C
- B. $-120.^{\circ}\text{C}$
- C. $+293^{\circ}\text{C}$
- D. $+393^{\circ}\text{C}$

31. What is the total number of protons contained in the nucleus of a carbon-14 atom?

- A. 6
- B. 8
- C. 12
- D. 14

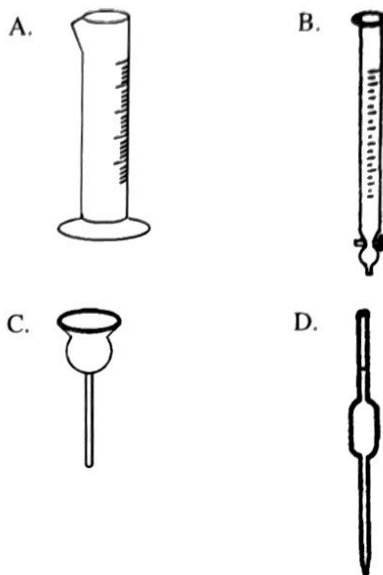
32. Which volume measurement is expressed in four significant figures?

- A. 5.50 mL
- B. 550. mL
- C. 55,500 mL
- D. 5,500. mL

33. The total number of protons and neutrons in the nuclide $^{37}_{17}\text{Cl}$ is

- A. 54
- B. 37
- C. 20
- D. 17

34. Which diagram represents a graduated cylinder?



35. The atomic number of an atom is always equal to the total number of

- A. neutrons in the nucleus
- B. protons in the nucleus
- C. neutrons plus protons in the atom
- D. protons plus electrons in the atom

36. According to an accepted chemistry reference, the heat of vaporization of water is 540 calories per gram. A student determined in the laboratory that the heat of vaporization of water was 620 calories per gram. The student's results had a percent error of

- A. 12.9 B. 14.8 C. 80.0 D. 87.1

37. Which atom has a nucleus that contains 13 protons and 14 neutrons?

- A. Mg B. Be C. Al D. N

38. If the rules for significant figures are observed in the addition example shown, how should the total for this addition be rewritten?

- | | | |
|-------------|--------------|-------------|
| A. 5,610.00 | B. 5,610.340 | 35.7 |
| | | 432.33 |
| C. 5,610.34 | D. 5,610.3 | + 5,142.312 |
| | | <hr/> |
| | | 5,610.342 |

39. Which of the following atoms has the greatest nuclear charge?

- A. Al B. Ar C. Si D. Na

40. Which particle has two neutrons?

- A. ${}^1_0\text{n}$ B. ${}^1_1\text{H}$ C. ${}^2_1\text{H}$ D. ${}^4_2\text{He}$

41. Which 1-mole sample of atoms requires the *least* energy to form a mole of positive ions?

- A. Ge B. Ca C. Ga D. K

42. Which conclusion directly resulted from the "gold foil experiment"?

- A. Atoms are mostly empty space.
B. Atoms are hard, indivisible spheres.
C. Electrons are located in shells.
D. Electrons have a small mass.

43. Which atom listed has the greatest ability to attract the electrons that form a bond between it and another atom?

- A. sodium B. magnesium
C. aluminum D. chlorine

44. In the modern wave-mechanical model of the atom, the orbitals are regions of the most probable location of

- A. protons
- B. neutrons
- C. electrons
- D. positrons

45. In all samples of the element potassium, each atom has

- A. 19 protons
- B. 20 neutrons
- C. 39 protons and neutrons
- D. 39 nucleons

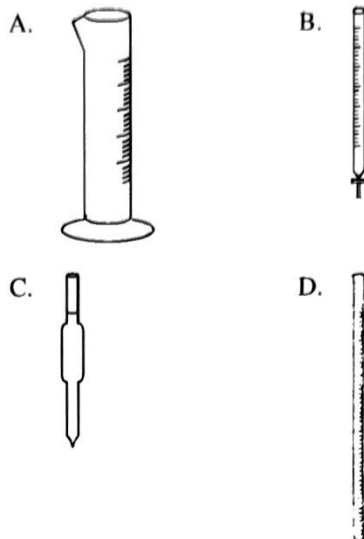
46. In which pair of elements do the nuclei of the atoms contain the same number of neutrons?

- A. ${}^7_3\text{Li}$ and ${}^9_4\text{Be}$
- B. ${}^{14}_7\text{N}$ and ${}^{16}_8\text{O}$
- C. ${}^{23}_{11}\text{Na}$ and ${}^{24}_{12}\text{Mg}$
- D. ${}^{32}_{16}\text{S}$ and ${}^{35}_{17}\text{Cl}$

47. What is the total number of neutrons in an atom of K-42?

- A. 19
- B. 20
- C. 23
- D. 42

48. Which diagram shown represents a pipette?



49. In an experiment the gram atomic mass of magnesium was determined to be 24.7. Compared to the accepted value 24.3, the percent error for this determination was

- A. 0.400
- B. 1.65
- C. 24.7
- D. 98.4

50. All of the atoms of argon have the same

- A. mass number
- B. atomic number
- C. number of neutrons
- D. number of nucleons