Ch1

1) Which of the following underlined items is not an intensive property?
A) A chemical reaction requires 3.00 g of oxygen.
B) The density of helium at 25°C is $1.64 \times 10^{-4}$ g/cm$^3$.
C) The melting point of aluminum metal is 933 K.
Answer: A

2) The horizontal rows of the periodic table are called
A) groups.
B) periods.
C) triads.
D) elements.
Answer: B

3) The vertical columns of the periodic table are called
A) groups.
B) periods.
C) triads.
D) elements.
Answer: A

4) 1 A group is also called ________ group in the periodic table.
A) alkali metal
B) alkaline earth metal
C) halogen
D) noble gas
Answer: A

5) 7 A group is also called ________ group in the periodic table.
A) alkali metal
B) alkaline earth metal
C) halogen
D) noble gas
Answer: C

6) Argon belongs to the ________ group of the periodic table.
A) alkali metal
B) alkaline earth
C) halogen
D) noble gas
Answer: D

7) Calcium belongs to the ________ group of the periodic table.
A) alkali metal
B) alkaline earth
C) halogen
8) Identify the element that has an atomic number of 15.
A) sulfur  
B) oxygen  
C) phosphorus  
D) silicon  
Answer: C

9) All of the following are SI base units of measurement, EXCEPT
A) meter  
B) gram  
C) second  
D) kelvin  
E) mole  
Answer: B

10) What symbol is used to express the factor, $10^{-6}$?
A) M  
B) m  
C) μ  
D) n  
Answer: C

11) What symbol is used to represent the factor $10^{-3}$?
A) M  
B) m  
C) μ  
D) n  
Answer: B

12) What symbol is used to represent the factor $10^{-9}$?
A) M  
B) m  
C) μ  
D) n  
Answer: D

13) The factor 0.01 corresponds to which prefix?
A) deka  
B) deci  
C) centi  
D) milli  
Answer: C

14) A sailor circumnavigated the earth and covered 4,264,000 meters. Express this number in standard scientific notation.
A) $4.264 \times 10^7$ m
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B) $4.264 \times 10^{-6}$ m
C) $4.264 \times 10^{-6}$ m
D) $4.264 \times 10^{7}$ m
Answer: C

15) Convert 1 μm to meters.
A) $1 \times 10^{-9}$ m
B) $1 \times 10^{-6}$ m
C) $1 \times 10^{-3}$ m
D) $1 \times 10^{6}$ m
Answer: B

16) The outside temperature is 35°C, what is the temperature in K?
A) -238 K
B) 308 K
C) 95 K
D) 31 K
E) 63 K
Answer: B

17) Determine the density of an object that has a mass of 149.8 g and displaces 12.1 mL of water when placed in a graduated cylinder.
A) 8.08 g/mL
B) 1.38 g/mL
C) 12.4 g/mL
D) 18.1 g/mL
E) 11.4 g/mL
Answer: C

18) Determine the volume of an object that has a mass of 455.6 g and a density of 19.3 g/cm$^3$.
A) 87.9 mL
B) 42.4 mL
C) 18.5 mL
D) 23.6 mL
E) 31.2 mL
Answer: D

19) If an object weighs 32.5 g and it is placed in 14.0 mL of water, the volume increases to 24.0 mL, what is the density of the material of which it is made?

20) Convert the quantity 2.0 mg/cm$^2$ into Kg/m$^2$ ?

21) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 1.71 g/mL, 1.72 g/mL, 1.70 g/mL, 1.69 g/mL. If the actual value for the density of the sugar solution is 1.40 g/mL, which statement below best describes her results?
A) Her results are precise, but not accurate.
B) Her results are accurate, but not precise.
C) Her results are both precise and accurate
D) Her results are neither precise nor accurate.
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E) It isn't possible to determine with the information given.
Answer: A

22) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 1.79 g/mL, 1.81 g/mL, 1.80 g/mL, 1.81 g/mL. If the actual value for the density of the sugar solution is 1.80 g/mL, which statement below best describes her results?
A) Her results are precise, but not accurate.
B) Her results are accurate, but not precise.
C) Her results are both precise and accurate
D) Her results are neither precise nor accurate.
E) It isn't possible to determine with the information given.
Answer: C

23) Read the temperature with the correct number of significant figures.

A) 87°C
B) 87.2°C
C) 87.20°C
D) 87.200°C
E) 87.2000°C
Answer: C

24) What value should be reported for the buret reading shown?
Ch2

25) The observation that 15.0 g of hydrogen reacts with 120.0 g of oxygen to form 135.0 g of water is evidence for the law of
A) definite proportions.
B) energy conservation.
C) mass conservation.
D) multiple proportions.
Answer: C

26. The Law of Conservation of Mass states that
- the mass of the products is greater than the mass of the reactants.
- the mass of the products is less than the mass of the reactants.
- the mass of the products is equal to the mass of the reactant.
- none of the above

27) Methane and oxygen react to form carbon dioxide and water. What mass of water is formed if 3.2 g of methane reacts with 12.8 g of oxygen to produce 8.8 g of carbon dioxide?
A) 7.2 g
B) 8.8 g
C) 14.8 g
D) 16.0 g
Answer: A

28) Which of the following statements is FALSE according to Dalton's Atomic Theory?
A) Atoms combine in simple whole number ratios to form compounds.
B) All atoms of chlorine have identical properties that distinguish them from other elements.
C) One carbon atom will combine with one oxygen atom to form a molecule of carbon monoxide.
D) Atoms of sodium do not change into another element during chemical reaction with chlorine.
E) An atom of nitrogen can be broken down into smaller particles that will still have the unique properties of nitrogen.
Answer: E

29) Which of the following statements is not a postulate of Dalton's atomic theory?
A) Each element is characterized by the mass of its atoms.
B) Atoms are composed of protons, neutrons, and electrons.
C) Chemical reactions only rearrange atomic combinations.
D) Elements are composed of atoms.
Answer: B
30) The existence of electrons in atoms of all elements was demonstrated by
A) Millikan's oil drop experiment.
B) Rutherford's gold foil experiment.
C) Thomson's cathode ray tube experiment.
D) None of these
Answer: C

31) The charge-to-mass ratio of an electron was established by
A) Millikan's oil drop experiment.
B) Rutherford's gold foil experiment.
C) Thomson's cathode ray tube experiment.
D) None of these
Answer: C

32) The existence of neutrons in the nucleus of an atom was demonstrated by
A) Millikan's oil drop experiment.
B) Rutherford's gold foil experiment.
C) Thomson's cathode ray tube experiment.
D) None of these
Answer: D

33) Most of the alpha particles directed at a thin gold foil in Rutherford's experiment
A) bounced directly back from the foil.
B) passed directly through the foil undeflected.
C) passed through the foil but were deflected at an angle.
D) were absorbed by the foil.
Answer: B

34) Identify the charges of the protons, neutrons, and electrons.
A) protons +1, neutrons 0, electrons -1
B) protons 0, neutrons -1, electrons +1
C) protons -1, neutrons 0, electrons +1
D) protons 0, neutrons +1, electrons -1
E) protons +1, neutrons -1, electrons 0
Answer: A

35) The mass number is equal to
A) the sum of the number of the electrons and protons.
B) the sum of the number of the neutrons and electrons.
C) the sum of the number of protons, neutrons, and electrons.
D) the sum of the number of protons and neutrons.
Answer: D

36) Which of the following two atoms are isotopes?
A) \(^{40}\text{Ar}\) and \(^{40}\text{Ca}\)
B) \(^{12}\text{C}\) and \(^{13}\text{C}\)
C) \(^{35}\text{Cl}\) and \(^{80}\text{Br}\)
D) $^{24}_{12}\text{Mg}$ and $^{12}_{6}\text{C}$

Answer: B

37) Which of the following represent isotopes?

A: $^{25}_{21}\text{[ ]}$  B: $^{21}_{25}\text{[ ]}$  C: $^{27}_{21}\text{[ ]}$  D: $^{25}_{23}\text{[ ]}$

A) A and B  
B) A and C  
C) A and D  
D) C and D

Answer: B

38) How many protons (p), neutrons (n), and electrons (e) are in one atom of $^{23}_{12}\text{Mg}$?

A) 12 p, 12 n, 12 e  
B) 12 p, 11 n, 12 e  
C) 12 p, 11 n, 10 e  
D) 12 p, 11 n, 14 e

Answer: B

39) Calculate the atomic mass of element "X", if it has 2 naturally occurring isotopes with the following masses and natural abundances:

<table>
<thead>
<tr>
<th>Isotopes</th>
<th>Mass (amu)</th>
<th>Abundance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-45</td>
<td>44.8776 amu</td>
<td>32.88%</td>
</tr>
<tr>
<td>X-47</td>
<td>46.9443 amu</td>
<td>67.12%</td>
</tr>
</tbody>
</table>

A) 46.26 amu  
B) 45.91 amu  
C) 46.34 amu  
D) 46.84 amu  
E) 44.99 amu

Answer: A

40) An element has two naturally occurring isotopes. One has an abundance of 37.4% and an isotopic mass of 184.953 amu, and the other has an abundance of 62.6% and a mass of 186.956 amu. What is the atomic weight of the element?

A) 185.702 amu  
B) 185.954 amu  
C) 186.207 amu  
D) 186.956 amu

Answer: C

41) What mass (in mg) does 2.63 moles of nickel have?

A) 44.8 mg  
B) $2.23 \times 10^4$ mg  
C) 129 mg  
D) $3.56 \times 10^5$ mg  
E) $1.54 \times 10^5$ mg

Answer: E
42) How many moles and how many atoms of zinc are in a sample weighing 34.9 g?
A) 0.533 mol, 8.85 \times 10^{-25} \text{ atoms}
B) 0.533 mol, 3.21 \times 10^{23} \text{ atoms}
C) 1.87 mol, 3.10 \times 10^{-24} \text{ atoms}
D) 1.87 mol, 1.13 \times 10^{24} \text{ atoms}
Answer: B

43) Calculate the mass (in kg) of 4.87 \times 10^{25} \text{ atoms of Zn.}
A) 5.29 kg
B) 1.89 kg
C) 8.09 kg
D) 1.24 kg
E) 1.09 kg
Answer: A

44) How many moles of potassium are contained in 300 g of potassium?
A) 7.67 moles
B) 1.44 moles
C) 20.0 moles
D) 15.8 moles
E) 9.69 moles
Answer: A

45) Identify a cation.
A) An atom that has lost an electron.
B) An atom that has gained an electron.
C) An atom that has lost a proton and a neutron.
D) An atom that has gained a neutron.
Answer: A

46) Identify an anion.
A) An atom that has lost an electron.
B) An atom that has gained an electron.
C) An atom that has lost a neutron and a proton.
D) An atom that has gained a neutron.
Answer: B

47) Predict the charge of the single atom ions formed by these main group elements
A) Al
B) S
C) F
D) Ca

48) Which of the following metal commonly forms +3 ions?
A) Fe
B) Li
C) Zn
D) Al
E) S
Answer: D

49) Give the number of protons in Na+.1.
A) 10
B) 13
C) 9
D) 11
E) 12
Answer: D

50) What is the identity of element Q if the ion Q2+ contains 10 electrons?
A) C
B) O
C) Ne
D) Mg
Answer: D

51) Give the number of electrons in P-3.
A) 18
B) 12
C) 19
D) 15
E) 16
Answer: A

52) Give the number of protons in Na+.1.
A) 10
B) 13
C) 9
D) 11
E) 12
Answer: D

53) Calculate the formula mass of H2CO3.
A) 62.03 g/mole
B) 29.02 g/mole
C) 61.02 g/mole
D) 60.01 g/mole
E) 74.04 g/mole
Answer: A

54)

Boron has two naturally occurring isotopes: boron-10 (abundance = 19.8%, mass = 10.013 amu) and boron-11 (abundance = 80.2%, mass = 11.009 amu). Calculate the atomic mass of boron.