1. Which idea of John Dalton is no longer considered part of the modern view of atoms?

    A   Atoms are extremely small.

    B   Atoms of the same element have identical masses.

    C   Atoms combine in simple whole number ratios to form compounds.

    D   Atoms of different elements can combine in different ratios to form different compounds.

2. Which **best** describes the current atomic theory?

    A   Atoms consist of electrons circling in definite orbits around a positive nucleus.

    B   Atoms are composed of electrons in a cloud around a positive nucleus.

    C   Atoms can easily be split, at which time they become radioactive.

    D   An atom's mass is determined by the mass of its neutrons.

3. What is the nuclear composition of uranium-235?

    A   92 electrons + 143 protons

    B   92 protons + 143 electrons

    C   143 protons + 92 neutrons

    D   92 protons + 143 neutrons

4. Which **best** describes the relationship between subatomic particles in any neutral atom?

    A   The number of protons equals the number of electrons.

    B   The number of protons equals the number of neutrons.

    C   The number of neutrons equals the number of electrons.

    D   The number of neutrons is greater than the number of protons.

5. What is the name of the compound PbO_2?

    A   lead oxide

    B   lead(II) oxide

    C   lead oxide(II)

    D   lead(IV) oxide

6.   What is the name of HCl (aq)?

   A   chloric acid

   B   hydrochloric acid

   C   hydrogen chloride

   D   perchloric acid

7.   What is the chemical formula for calcium nitrate?

   A $CaNO_3$

   B $Ca(NO_2)_2$

   C $Ca(NO_3)_2$

   D Ca_3N_2

8.   Which is the correct formula for dinitrogen pentoxide?

   A N_4O

   B NO_2

   C N_2O_5

   D NO_4

9.   If the volume of an 18.5-g piece of metal is 2.35 cm^3, what is the identity of the metal?

   A   iron

   B   lead

   C   nickel

   D   zinc

10.   Which substance listed in the table is a liquid at 27°C?

	Melting Point	Boiling Point
I	28°C	140°C
II	⁻10°C	25°C
III	20°C	140°C
IV	⁻90°C	14°C

   A   I

   B   II

   C   III

   D   IV

11. Which will increase the solubility of *most* solid solutes?

    A   decreasing the temperature

    B   decreasing the amount of solvent at constant temperature

    C   increasing the amount of solute at constant temperature

    D   increasing the temperature

12. What happens to the pressure of a constant mass of gas at constant temperature when the volume is doubled?

    A   The pressure is doubled.

    B   The pressure remains the same.

    C   The pressure is reduced by $\frac{1}{2}$.

    D   The pressure is reduced by $\frac{1}{4}$.

13. The total pressure in a closed vessel containing N_2, O_2 and CO_2 is 30 atm. If the partial pressure of N_2 is 4 atm, and the partial pressure of O_2 is 6 atm, what is the partial pressure of CO_2?

    A   20 atm

    B   30 atm

    C   40 atm

    D   50 atm

14. What is the pressure, in atmospheres, exerted by a 0.100-mol sample of oxygen in a 2.00-L container at 273°C?

    A 4.48×10^{-1} atm

    B 2.24×10^{0} atm

    C 1.12×10^{3} atm

    D 2.24×10^{3} atm

15. What type of bonding is associated with compounds that have the following characteristics:

    • high melting points
    • conduct electricity in the molten state
    • solutions conduct electricity
    • normally crystalline solids at room temperature.

    A   covalent

    B   ionic

    C   hydrogen

    D   metallic

16. Which is a unique characteristic of the bonding between metal atoms?

   A   Atoms require additional electrons to reach a stable octet.

   B   Atoms must give away electrons to reach a stable octet.

   C   Atoms share valence electrons only with neighboring atoms to reach a stable octet.

   D   Delocalized electrons move among many atoms creating a sea of electrons.

17. Which pair of elements would **_most likely_** bond to form a covalently bonded compound?

   A   sodium and fluorine

   B   barium and chlorine

   C   phosphorus and oxygen

   D   magnesium and sulfur

18. Based on the VSEPR theory, what is the molecular geometry of a molecule of PI_3?

   A   linear

   B   tetrahedral

   C   trigonal planar

   D   trigonal pyramidal

19.   Consider this phase diagram:
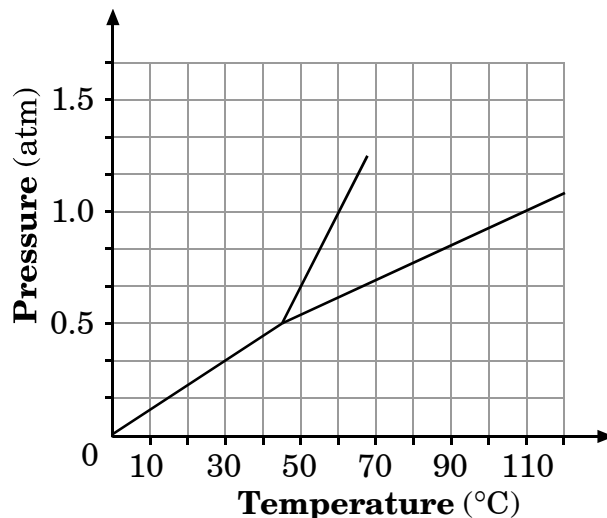
At what temperature does the normal boiling point occur?

A   45°C

B   60°C

C   100°C

D   110°C

20.   What happens when energy is removed from liquid water?

A   Molecules slow down, and more hydrogen bonds are formed.

B   Molecules slow down, and more hydrogen bonds are broken.

C   Molecules move faster, and more hydrogen bonds are formed.

D   Molecules move faster, and more hydrogen bonds are broken.

End of Goal 2 Sample Items

1   **Objective: 2.01**
Analyze the historical development of the current atomic theory.
a. Early contributions: Democritus and Dalton.
b. The discovery of the electron: Thomson and Millikan.
c. The discovery of the nucleus, proton and neutron: Rutherford and Chadwick.
d. The Bohr model.
e. The quantum mechanical model.
Thinking Skill: Analyzing   **Correct Answer:**   B

2   **Objective: 2.01**
Analyze the historical development of the current atomic theory.
a. Early contributions: Democritus and Dalton.
b. The discovery of the electron: Thomson and Millikan.
c. The discovery of the nucleus, proton and neutron: Rutherford and Chadwick.
d. The Bohr model.
e. The quantum mechanical model.
Thinking Skill: Knowledge   **Correct Answer:**   B

3   **Objective: 2.02**
Examine the nature of atomic structure.
a. Subatomic particles: protons, neutrons, and electrons.
b. Mass number and/or Atomic number.
c. Isotopes.
Thinking Skill: Applying   **Correct Answer:**   D

4   **Objective: 2.02**
Examine the nature of atomic structure.
a. Subatomic particles: protons, neutrons, and electrons.
b. Mass number and/or Atomic number.
c. Isotopes.
Thinking Skill: Applying   **Correct Answer:**   A

5   **Objective: 2.03**
Apply the language and symbols of chemistry.
a. Name compounds using the IUPAC conventions.
b. Write formulas of simple compounds from their names.
Thinking Skill: Applying   **Correct Answer:**   D

6   **Objective: 2.03**
Apply the language and symbols of chemistry.
a. Name compounds using the IUPAC conventions.
b. Write formulas of simple compounds from their names.
Thinking Skill: Applying   **Correct Answer:**   B

7   **Objective: 2.03**
           Apply the language and symbols of chemistry.
           a. Name compounds using the IUPAC conventions.
           b. Write formulas of simple compounds from their names.
           Thinking Skill: Applying   **Correct Answer:**   C

8   **Objective: 2.03**
           Apply the language and symbols of chemistry.
           a. Name compounds using the IUPAC conventions.
           b. Write formulas of simple compounds from their names.
           Thinking Skill: Applying   **Correct Answer:**   C

9   **Objective: 2.04**
           Identify substances using their physical properties:
           a. Melting points and/or Boiling points.
           b. Density.
           c. Solubility.
           Thinking Skill: Applying   **Correct Answer:**   A

10   **Objective: 2.04**
           Identify substances using their physical properties:
           a. Melting points and/or Boiling points.
           b. Density.
           c. Solubility.
           Thinking Skill: Analyzing   **Correct Answer:**   C

11   **Objective: 2.04**
           Identify substances using their physical properties:
           a. Melting points and/or Boiling points.
           b. Density.
           c. Solubility.
           Thinking Skill: Analyzing   **Correct Answer:**   D

12   **Objective: 2.05**
           Analyze the basic assumptions of kinetic molecular theory and its applications:
           a. Ideal Gas Equation.
           b. Combined Gas Law.
           c. Dalton's Law of Partial Pressures.
           Thinking Skill: Analyzing   **Correct Answer:**   C

13   **Objective: 2.05**
           Analyze the basic assumptions of kinetic molecular theory and its applications:
           a. Ideal Gas Equation.

b. Combined Gas Law.
c. Dalton's Law of Partial Pressures.
Thinking Skill: Applying **Correct Answer:** A

14 **Objective:** 2.05
Analyze the basic assumptions of kinetic molecular theory and its applications:
a. Ideal Gas Equation.
b. Combined Gas Law.
c. Dalton's Law of Partial Pressures.
Thinking Skill: Applying **Correct Answer:** B

15 **Objective:** 2.06
Assess bonding in metals and ionic compounds as related to chemical and physical properties.
Thinking Skill: Analyzing **Correct Answer:** B

16 **Objective:** 2.06
Assess bonding in metals and ionic compounds as related to chemical and physical properties.
Thinking Skill: Applying **Correct Answer:** D

17 **Objective:** 2.07
Assess covalent bonding in molecular compounds as related to molecular geometry and chemical and physical properties.
a. Molecular.
b. Macromolecular.
c. Hydrogen bonding and other intermolecular forces (dipole/dipole interaction, dispersion). d. VSEPR theory.
Thinking Skill: Analyzing **Correct Answer:** C

18 **Objective:** 2.07
Assess covalent bonding in molecular compounds as related to molecular geometry and chemical and physical properties.
a. Molecular.
b. Macromolecular.
c. Hydrogen bonding and other intermolecular forces (dipole/dipole interaction, dispersion). d. VSEPR theory.
Thinking Skill: Analyzing **Correct Answer:** D

19 **Objective:** 2.08
Assess the dynamics of physical equilibria.
a. Interpret phase diagrams.
b. Factors that affect phase changes.
Thinking Skill: Analyzing **Correct Answer:** D

20   **Objective: 2.08**
Assess the dynamics of physical equilibria.
a. Interpret phase diagrams.
b. Factors that affect phase changes.
Thinking Skill: Analyzing   **Correct Answer:**   A