

Name: _____

1. The table below shows the atomic mass and natural abundance of the two naturally occurring isotopes of lithium.

Naturally Occurring Isotopes of Lithium

Isotope	Atomic Mass (u)	Natural Abundance (%)
Li-6	6.015	7.6
Li-7	7.016	92.4

Which numerical setup can be used to determine the atomic mass of naturally occurring lithium?

- A. $(7.6)(6.015 \text{ u}) + (92.4)(7.016 \text{ u})$
B. $(0.076)(6.015 \text{ u}) + (0.924)(7.016 \text{ u})$
C.
$$\frac{(7.6)(6.015\text{u}) + (92.4)(7.016\text{u})}{2}$$

D.
$$\frac{(0.076)(6.015\text{u}) + (0.924)(7.016\text{u})}{2}$$
2. At STP, which element is malleable and a good conductor of electricity?
- A. xenon
B. silicon
C. platinum
D. hydrogen
3. Which electron configuration represents the distribution of electrons in a potassium atom in the ground state?
- A. 2-8-8-1
B. 2-8-7-2
C. 2-8-5
D. 2-7-6
4. The electrical conductivity of an aqueous solution depends on the concentration of which particles in the solution
- A. molecules
B. electrons
C. atoms
D. ions



Which statement describes the energy changes that occur in this reaction?

- A. Energy is absorbed as bonds are formed, only.
B. Energy is released as bonds are broken, only.
C. Energy is absorbed as bonds are formed, and energy is released as bonds are broken.
D. Energy is absorbed as bonds are broken, and energy is released as bonds are formed.
6. Ice, $\text{H}_2\text{O}(\text{s})$, is classified as
- A) An ionic compound
B) A molecular compound
C) A homogeneous mixture
D) A heterogeneous mixture
7. As an electron in an atom moves from a higher energy state to a lower energy state, the atom
- (A) becomes a negative ion
(B) becomes a positive ion
(C) releases energy
(D) absorbs energy
8. Which statement describes a concept included in the wave-mechanical model of the atom?
- (A) Protons, neutrons, and electrons are located in the nucleus.
(B) Electrons orbit the nucleus in shells at fixed distances.
(C) Atoms are hard, indivisible spheres.
(D) Electrons are located in regions called orbitals
9. Which general trends in atomic radius and electronegativity are observed as the elements in Period 3 are considered in order of increasing atomic number?
- A. Atomic radius decreases and electronegativity increases.
B. Atomic radius increases and electronegativity decreases.
C. Both atomic radius and electronegativity increase.
D. Both atomic radius and electronegativity decrease.
10. Which particle diagram represents *one* diatomic

11. Which term represents an intermolecular force in a sample of water?

- A. hydrogen bonding
- B. covalent bonding
- C. metallic bonding
- D. ionic bonding

12. Which process is a chemical change?

Which Lewis electron-dot diagram represents the bonding in potassium iodide?

- A) $K^+ [:\ddot{I}:]^-$
- B) $[\ddot{K}]^- I^+$
- C) $K:\ddot{I}:$
- D) $:\ddot{K}:I$

13. Which property is used to determine the degree of polarity between two bonded atoms?

- A. density
- B. electronegativity
- C. pressure
- D. temperature

14. A molecule must be nonpolar if the molecule

- A. is linear
- B. is neutral
- C. has ionic and covalent bonding
- D. has a symmetrical charge distribution

15. Which element has atoms in the ground state with the greatest number of valence electrons?

- A. tin
- B. sulfur
- C. arsenic
- D. fluorine

16. Which term identifies the most probable location of an electron in the wave-mechanical model of the atom?

- A. anode
- B. orbital
- C. nucleus
- D. cathode

molecule in the gas phase?

Key
○ = atom of one element
● = atom of another element

A.

B.

C.

D.

18. How many pairs of electrons are shared between the nitrogen atoms in a molecule of N_2 ?

- A. 5
- B. 2
- C. 3
- D. 6

19. Which element has the highest boiling point at standard pressure?

- A. Mg
- B. Na
- C. Rb
- D. Sr

20. A compound is a substance composed of two or more elements that are

- A. physically mixed in a fixed proportion
- B. physically mixed in a variable proportion
- C. chemically combined in a fixed proportion
- D. chemically combined in a variable proportion

21. What is the charge of the nucleus of a copper atom?

- A. +1
- B. +2
- C. +29
- D. +64

17. An atom that contains six protons, six neutrons, and six electrons has a mass of approximately

- A. 12 u
- B. 12 g
- C. 18 u
- D. 18 g

25. Which statement describes the location of two types of subatomic particles in a helium atom?

- A. Protons and neutrons are located in the nucleus.
- B. Protons and neutrons are located outside the nucleus.
- C. Protons and electrons are located in the nucleus.
- D. Protons and electrons are located outside the nucleus.

26. Which two notations represent isotopes of the same element?

- A. ${}^{14}_7\text{N}$ and ${}^{18}_7\text{N}$
- B. ${}^{20}_7\text{N}$ and ${}^{20}_{10}\text{Ne}$
- C. ${}^{14}_7\text{N}$ and ${}^{17}_{10}\text{Ne}$
- D. ${}^{19}_7\text{N}$ and ${}^{16}_{10}\text{Ne}$

27. What occurs when potassium reacts with chlorine to form potassium chloride?

- A. Electrons are shared and the bonding is ionic.
- B. Electrons are shared and the bonding is covalent.
- C. Electrons are transferred and the bonding is ionic.
- D. Electrons are transferred and the bonding is covalent.

28. The table below gives the masses of two different subatomic particles found in an atom.

22. Which list of elements contains a metal, a metalloid, and a nonmetal?

- A. Ag, Si, I₂
- B. Ge, As, Ne
- C. K, Cu, Br₂
- D. S, Cl₂, Ar

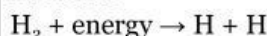
23. Which group on the Periodic Table has two elements that exist as gases at STP?

- A. Group 1
- B. Group 2
- C. Group 16
- D. Group 17

24. Which pair of atoms has the most polar bond?

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

29. Given the balanced equation representing a reaction:



What occurs as bonds are broken in one mole of H₂ molecules during this reaction?

- A. Energy is absorbed and one mole of unbonded hydrogen atoms is produced.
- B. Energy is absorbed and two moles of unbonded hydrogen atoms are produced.
- C. Energy is released and one mole of unbonded hydrogen atoms is produced.
- D. Energy is released and two moles of unbonded hydrogen atoms are produced.

30. Which electron configuration represents an excited state for an atom of calcium?

- A. 2-8-7-1
- B. 2-8-7-2
- C. 2-8-7-3
- D. 2-8-8-2

31. Which list of elements is arranged in order of increasing electronegativity?

- A. Be, Mg, Ca
- B. F, Cl, Br
- C. K, Ca, Sc
- D. Li, Na, K

Subatomic Particles and Their Masses

Subatomic Particle	Mass (g)
X	1.67×10^{-24}
Z	9.11×10^{-28}

Which of the subatomic particles are each paired with their corresponding name?

- A. X, proton and Z, electron
 - B. X, proton and Z, neutron
 - C. X, neutron and Z, proton
 - D. X, electron and Z, proton
35. The atomic mass of an element is the weighted average of the atomic masses of
- A. the least abundant isotopes of the element
 - B. the naturally occurring isotopes of the element
 - C. the artificially produced isotopes of the element
 - D. the natural and artificial isotopes of the element
36. What is the total number of neutrons in an atom of K-42?
- A) 19 B) 20 C) 23 D) 42
37. Compared to an atom of C-12, an atom of C-14 has a greater
- A) number of electrons
 - B) number of protons
 - C) atomic number
 - D) mass number
38. Which list of elements consists of a metal, a metalloid, and a noble gas?
- A. aluminum, sulfur, argon
 - B. magnesium, sodium, sulfur
 - C. sodium, silicon, argon
 - D. silicon, phosphorus, chlorine
39. The mass of a proton is approximately equal to the mass of
- A) an electron
 - A) a neutron
 - B) an alpha particle
 - C) a beta particle
40. Which two elements have the most similar chemical properties?
- A. beryllium and magnesium

32. Which property can be defined as the ability of a substance to be hammered into thin sheets?

- A. conductivity
 - B. malleability
 - C. melting point
 - D. solubility
33. Which element has a melting point higher than the melting point of rhenium?
- A. iridium
 - B. osmium
 - C. tantalum
 - D. tungsten
34. Which element is *least* likely to undergo a chemical reaction?
- A. lithium
 - B. carbon
 - C. fluorine
 - D. neon
41. Which formula represents a polar molecule?
- A. O₂
 - B. CO₂
 - C. NH₃
 - D. CH₄
42. Which diatomic molecule is formed when the two atoms share six electrons?
- A. H₂
 - B. N₂
 - C. O₂
 - D. F₂
43. The arrangement of the elements from left to right in Period 4 on the Periodic Table is based on
- A. atomic mass
 - B. atomic number
 - C. the number of electron shells
 - D. the number of oxidation states
44. What is the charge of the nucleus of a copper atom?
- A) +64 B) +29 C) +2 D) +4
45. Which particle has two neutrons?
- A. ${}^1_0\text{n}$
 - B. ${}^1_1\text{H}$

- B. hydrogen and helium
- C. phosphorus and sulfur
- D. potassium and strontium

Choice of Topics:

- Atomic Models
- Electron energy and transitions
- Isotopes
- Classification of elements
- Covalent Bonding
- Ionic Bonding
- Dot diagrams
- Bond polarity
- Molecular Polarity
- Elements in the same group
- Trends in the periodic table
- Nuclear Charge
- Subatomic Particles (charges, masses, locations)
- Finding neutron number
- Atomic mass vs. mass number
- Valence Electron
- Dot diagrams
- Properties of noble gasses
- Hydrogen bonding
- Properties of metals and nonmetals

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

46. The valence electrons in an atom of phosphorus in the ground state are all found in

- A. the first shell
- B. the second shell
- C. the third shell
- D. the fourth shell

47. Which change occurs when an atom in an excited state returns to the ground state?

- A. Energy is emitted.
- B. Energy is absorbed.
- C. The number of electrons decreases.
- D. The number of electrons increases.

Optional. Fill out first page correctly: 5 point coupon. Fill out two pages correctly: 10 point coupon.

Question #	Topic to study	Vocabulary to Study
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