

Unit 1 Review: Matter and Chemical Bonding

Test format: ~ 30 multiple choice, ~ 11 short written answers

Bring: Periodic Table, Calculator

Excerpt from the article "The Invisible Killer"

Dihydrogen monoxide (DHMO) is a colourless, odourless, tasteless chemical that kills thousands of people every year. Most of these deaths are caused by accidental inhalation of DHMO but the dangers do not end there. Prolonged exposure to DHMO in its solid form causes severe tissue damage. Symptoms of DHMO ingestion can include excessive sweating and urination, a bloated feeling, nausea, vomiting, and an electrolyte imbalance. For those who have become dependent, DHMO withdrawal means certain death.

Dihydrogen monoxide:

is also known as hydroxyl acid and is the major component of acid rain.

contributes to the "greenhouse effect."

may cause severe burns.

contributes to the erosion of our natural landscape.

accelerates corrosion and rusting of many metals.

may cause electrical failures and decreased effectiveness of automobile brakes.

has been found in excised tumors of terminal cancer patients.

Contamination Is Reaching Epidemic Proportions! Quantities of dihydrogen monoxide have been found in every stream, lake, and reservoir in North America. The pollution is global - this chemical has even been found in Antarctic ice.

Around the globe, DHMO causes billions of dollars of property damage annually.

Despite the danger, dihydrogen monoxide continues to be used:

as an industrial solvent and coolant

as a fire retardant

in nuclear power plants

in the distribution of pesticides

as an additive in "junk-foods" and other food products

in the production of Styrofoam

Companies routinely dump waste DHMO into rivers and oceans, yet nothing can be done to stop them since this practice is legal in every country.

1. Do you think DHMO should be banned? Justify your answer. Write the formula for dihydrogen monoxide.
2. Name these groups on the periodic table: 1, 2, 17, 18, 3-12, and the 2 rows at the bottom of the table.
3. Summarize the contributions of Dalton, Thompson, Rutherford, Bohr, and Chadwick.
4. Who developed the first periodic table? How are the elements ordered?
5. Define atomic number and atomic mass. Why are atomic masses not whole numbers?
6. A neutral atom of Cl-37 has ___ neutrons. Its mass # is ___, its atomic # is ___, and it has ___ electrons.
7. How does atomic size change going down a group or across a period? Explain.
8. Define ionization energy, electron affinity, and electronegativity. How do these change as we move down a group or across a period? Explain each trend (referring to atomic size, nuclear charge, etc.).
9. Draw Lewis diagrams for: O, Al, Na, I, Xe. Draw the Lewis structures for their ion?
10. Identify each as ionic or covalent: a) CO_2 , b) $NaCl$, c) $FeCl_2$, d) CCl_4 , e) Al_2SO_3 .
11. Illustrate the bonding between Mg and P using the three steps (equation) to show it's formation.
12. Use Lewis diagrams to show the bonding between O + Cl, P + H, Ca + Cl, N + N.
13. List the typical physical properties of ionic & covalent compounds? What causes these differences?
14. Classify each bond as ionic, covalent, slightly polar covalent, or polar covalent: H_2 , CH_4 , LiF, H_2O .
15. Use valence (crossover) to determine the chemical formulae for H + Cl, O + Na, P + Cl, Al + O, Mg + O.
16. What are the four molecular shapes? Give an example for each.
17. What is the difference between a polar molecule and a nonpolar molecule?
18. Draw the following molecules and indicate if they are polar or nonpolar: a) SeH_2 , b) CH_3Cl c) HBr
19. What is the difference between intermolecular forces and intramolecular forces?
20. What are the three types of intermolecular forces?
21. What forces would be involved in the following molecules: a) NH_3 b) HBr Who would have the higher mp?

Additional review questions can be found in the textbook: Unit 1 Self-Assessment Q# 1-8, 11-20, 23, 24, 25 pg. 102-103 Unit 1 Review Q# 1-24, 26-30, 36-40, 42-45, 47, 53-55, 57-61, 66 pg. 96-101