UNIT 1 REVIEW: MATTER AND CHEMICAL BONDING

You will be provided with: a periodic table with symbols and valences (no element names), a list of polyatomic ions (names, formulas, and valences), and the activity series.
The first review question below relates to the article; answers to other questions can be found in your notes.

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 hydroxl 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.
- in nuclear power plants.
- in the production of Styrofoam.
- as a fire retardant.
- in the distribution of pesticides.
- as an additive in "junk-foods" and other food products.

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. Distinguish between a) STP, SATP, b) element, compound, c) group, period, d) metal, nonmetal.
3. What are the names associated with these groups on the periodic table: I (far left), II, VII (2nd from right), VIII (far right), the 10 columns between II and III, and the 2 rows at the bottom of the table.
4. Summarize the contributions of Democritus, Aristotle, Dalton, Thompson, Rutherford, Bohr (1 sentence each).
5. Who developed the first periodic table? How were elements ordered at that time?
6. Define atomic number and atomic mass. Why are atomic masses not whole numbers?
7. A neutral atom of ^{37}Cl has __ neutrons. Its mass # is __, its atomic # is __, and it has __ electrons.
8. How does atomic size change going down a group or across a period? Explain.
9. 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.).
10. Draw Lewis diagrams for: O, Al, Na, I, Xe. What are the stable ions and the valences for these elements?
11. Identify each as ionic or covalent: a) CO_2, b) NaCl, c) $FeCl_2$, d) CCl_4, e) Al_2SO_3.
12. Illustrate the bonding between Mg and P using both Lewis diagrams and B-R diagrams.
13. Use Lewis diagrams and structures to show the bonding between O + Cl, P + H, Ca + Cl, N + N.
14. List the typical physical properties of ionic & covalent compounds? What causes these differences?
15. Classify as ionic, covalent, or polar covalent: H_2, CH_4, LiF, H_2O. Order these from low to high boiling points.
16. Use valence to determine the chemical formulae for H + Cl, O + Na, P + Cl, Al + O, Mg + O.
17. Give names or formulas: a) CuI, b) hydroiodic acid, c) N_2O_4, d) H_3PO_3, e) phosphorus pentabromide, f) ferric oxide, g) potassium nitride, h) oxalic acid, i) Cl_2O_7, j) HF(aq), k) $NiSO_4 \cdot 6H_2O$, l) HS(g)
18. Write general equations for the five types of chemical reactions. Complete question 3 on page 146.
19. Complete these: a) Ca + $CuSO_4$, b) $FeCl_2$ + Ag, c) H_2O + Ca, d) Al + H_2SO_4, e) Na + $Ni_3(PO_4)_2$, f) Au + HCl.

Additional review questions can be found in the textbook.