

1) Which one matches the **correctly spelled element names** with **chemical symbols**?

- a) None of the other answers
- b) phosphorous (P), aluminum (A), hydrogen (H), fluorine (F)
- c) carbon (C), neon (N), oxygen (O), boron (B)
- d) sulfur (S), iodine (I), copper (Co), vanadium (V)
- e) uranium (U), tungsten (W), potassium (K), yttrium (Y)

2) Which one matches the **element symbol for the atom** with its **atomic number**?

- a) O (8)
- b) oxygen (O)
- c) oxygen (O₂)
- d) oxygen (15.999)
- e) oxygen (8)

3) Which one matches the **element name** with its **atomic number**?

- a) O (8)
- b) O₂ (8)
- c) oxygen (O)
- d) oxygen (15.999)
- e) oxygen (8)

4) Which one matches the **atomic number** of an element with its **atomic mass**?

- a) O (8)
- b) O₂ (8)
- c) O (15.999)
- d) O₂ (15.999)
- e) 8 (15.999)

5) Which one matches the **element name** with its **atomic mass**?

- a) None of the other answers
- b) hydrogen (H)
- c) hydrogen (H₂)
- d) hydrogen (1.008)
- e) hydrogen (1)

6) Which one matches the **element symbol** with its **atomic mass**?

- a) O (15.999)
- b) oxygen (O)
- c) oxygen (O₂)
- d) oxygen (15.999)
- e) oxygen (8)

7) What is the **total number of bound atoms** in one formula unit of $\text{NH}_4\text{NO}_2 \cdot 2\text{H}_2\text{O}$?

- 8) What is the total number of bound **hydrogen** atoms in one formula unit of $\text{NH}_4\text{NO}_2 \cdot 2\text{H}_2\text{O}$?
- 9) Which one gives a correct count of the **species** in one formula unit of $\text{Ca}_3(\text{PO}_4)_2 \cdot 3\text{H}_2\text{O}$?
- bound phosphorous atoms (2), water molecules (3), bound hydrogen atoms (6), bound oxygen atoms (11)
 - bound phosphorous atoms (1), phosphate ions (2), bound hydrogen atoms (3), water molecules (0)
 - bound phosphorous atoms (2), calcium ions (3), water molecules (3), bound oxygen atoms (9)
 - None of the other answers
 - bound phosphorous atoms (1), water molecules (3), bound hydrogen atoms (2), bound oxygen atoms (5)
 - bound phosphorous atoms (2), phosphate ions (2), bound hydrogen atoms (2), water molecules (3)
- 10) Which elements are likely to have **similar chemical and physical properties**?
- 11) How many elements are in group 8B of the periodic table?
- 12) Which one correctly indicates the **physical states of elements** at room temperature?
- None of the other answers
 - S is a solid, Li is a liquid, and Ga is a gas
 - S is a gas, Li is a liquid, and Ga is a solid
 - S is a solid, Li is a solid, and Ga is a solid
 - S is a liquid, Li is a liquid, and Ga is a gas
- 13) Which period contains an element in the liquid state at room temperature?
- 14) Which answer is correct?
- O_2 is a compound. O_3 is an element.
 - O_2 is an element. O_3 is an element.
 - O_2 is an element. O_3 is a compound.
 - O_2 is a compound. O_3 is a compound.
 - None of the other answers.
- 15) Which answer is correct for chemical symbols?
- None of the other answers.
 - At is a molecule. Mo is a molecule.
 - At is an atom. Mo is a molecule.
 - At is a molecule. Mo is an atom.
 - At is an atom. Mo is an atom.

- 16) Which answer is correct?
- Cl_2 is a covalent compound. NO is a covalent compound.
 - None of the other answers.
 - Cl_2 is a covalent compound. NO is an ionic compound.
 - Cl_2 is an ionic compound. NO is a covalent compound.
 - Cl_2 is an ionic compound. NO is an ionic compound.
- 17) Which substance is best described as a formula unit:
- O_2
 - Ne
 - KO
 - HI
 - CO
- 18) Which one gives the expected **charges for ions** that come from bound atoms of Ca, Ga, and O?
- 19) Give a possible **charge for the cation and anion** in a hypothetical compound between a metal (M) and a nonmetal (N) in MN_6 ?
- 20) Give a possible **charge for the cation and anion** in a hypothetical compound between a metal (M) and a nonmetal (N) in MN_2 ?
- 21) Be able to name **metals, nonmetals, metalloids**. (Po is a _____, At is a _____, Te is a _____)
- 22) Be able to identify **alkali metals, alkaline earth metals, halogens, noble gases, main group elements, transition element, inner transition elements, lanthanides, actinides, metalloids**. (Li is a _____, Ca is a _____, Sc is a _____, In is a _____, Sb is a _____, I is a _____, Rn is a _____, U is a _____)
- 23) Name this compound using the rules discussed in class: NI_3
- 24) Name this compound using the rules discussed in class: AlI_3
- 25) Name this compound using the rules discussed in class: ScI_3
- 26) Name this compound using the rules discussed in class: $\text{Al}(\text{NO}_3)_3$
- 27) Name this compound using the rules discussed in class: $\text{Sc}(\text{NO}_3)_3$
- 28) Name this compound using the rules discussed in class: KI
- 29) Name this compound using the rules discussed in class: HI(g)
- 30) Name this compound using the rules discussed in class: HI(aq)
- 31) Name this compound using the rules discussed in class: $\text{H}_2\text{S}(\text{g})$
- 32) Name this compound using the rules discussed in class: $\text{H}_2\text{SO}_4(\text{aq})$
- 33) Name this compound using the rules discussed in class: H_2O
- 34) Name this compound using the rules discussed in class: NH_3

- 35) Provide the name for Ca^{2+} using the rules discussed in class.
- 36) Provide the name for Sc^{2+} using the rules discussed in class.
- 37) Provide the name for NH_4^+ using the rules discussed in class.
- 38) Provide the name for ClO^- using the rules discussed in class.
- 39) Provide the name for OH^- using the rules discussed in class.
- 40) Which one gives the correct number of **protons, neutrons, and electrons** for $^{34}\text{P}^{3-}$?
- 41) Be able to recognize chemical properties and physical properties: butane burns, carbon dioxide does not burn, silver is shiny, sulfur powder is not shiny, beer froze.
- 42-58) Work problems 23 to 39 in reverse. From the name, write the formula for indicated chemical species.
- 59) 2.0g of water (density= $1.0\text{g}/\text{cm}^3$) displaces how many grams of gasoline ($d=0.70$)?
- 60) 2.0g of water (density= $1.0\text{g}/\text{cm}^3$) displaces how many milliliters of gasoline ($d=0.70$)?
- 61) 13 brass spheres ($d=8.5\text{g}/\text{cm}^3$) displace what mass of water?
- 62) 13 brass spheres ($d=8.5\text{g}/\text{cm}^3$) displace what volume of water?
- 63) 13 brass spheres ($d=8.5\text{g}/\text{cm}^3$) with a total mass of 17.0g would displace what volume of water?
- 64) 13 brass spheres ($d=8.5\text{g}/\text{cm}^3$) with a total mass of 17.0g would displace what mass of water?
- 65) 17 brass spheres ($d=8.5\text{g}/\text{cm}^3$) each with an average mass of 1.0g would displace what mass of water (density= $1.0\text{g}/\text{cm}^3$)?
- 66) Work 64 and 65 backwards from the answer to determine the density of brass.
- 67) How many **grams** is 0.811 moles of $(\text{NH}_4)_2\text{SO}_4$
- 68) How many **moles** is 107g of $(\text{NH}_4)_2\text{SO}_4$
- 69) How many **grams** is 811 moles of $(\text{NH}_4)_2\text{SO}_4$
- 70) What is the **empirical formula** of $\text{C}_{12}\text{H}_{10}$?
- 71) What is the **molecular formula** of the empirical formula C_6H_5 if the molar mass of the compound is $308.424\text{g}/\text{mol}$?
- 72) Convert 15ft^3 into m^3
- 73) Presuming the calculation involves measurements with uncertainty, how many **significant digits** would be kept in the answer to this calculation: $(58200\text{g}-1000\text{g})/10000.0\text{cm}^3$?

1e, 2a, 3e, 4e, 5d, 6a, 7(14), 8(8), 9a, 10(elements in the same group; among groups, group VIIIA for noble gases has the most homogeneous chemical and physical properties), 11(12 in VIIIIB), 12(d, all are solids), 13(periods 4 and 6), 14(b, compounds form from 2 or more different elements), 15(e both are chemical symbols for atoms on the periodic table), 16(b, binary ionic compounds form from a metal and a nonmetal. NO is a covalent compound, but Cl_2 is an element), 17c (formula unit is a designation for ionic compounds), 18 (+2, +3, -2, a better term for charge is oxidation number which we will get to later in the course for this and the next questions), 19(+6 for the metal ion, M, the cation, and -1 for the nonmetal ion, N, the anion), 20(a number of combinations work +2 and -1, +4 and -2, +6 and -3, +8 and -4), 21(metal, nonmetal, metalloid). 22 (main group alkali metal, main group alkaline earth metal, transition element, main group metal, main group (it is a metalloid), main group halogen, main group noble gas, inner transition element actinide), 23(nitrogen triiodide), 24(aluminum iodide), 25 (scandium(III) iodide because scandium has more than one common oxidation state),

26(aluminum nitrate), 27(scandium(III) nitrate), 28(potassium iodide), 29(hydrogen iodide), 30(hydroiodic acid), 31(hydrosulfuric acid), 32(sulfuric acid), 33(water), 34 (ammonia), 35(calcium ion), 36(scandium(II) ion), 37(ammonium ion), 38(hypochlorite or hypochlorite ion, the word "ion" is redundant), 39(hydroxide or hydroxide ion), 40(15 protons, 19 neutrons, 18 electrons), 41(chemical, chemical, physical, physical, physical - many terms like ductile, conducts, malleable, and dissolves indicate physical properties, while terms like oxidize, burn, rot, and respire refer to chemical properties. Know these terms too.), 42-58(Use answers above and write the formula given in the question. This strategy is often good practice for studying.). 59(2.0g of water displaces 2.0cm³ of gasoline. 2.0cm³ of gasoline corresponds to 1.4g.), 60(Answer given in 59. You do not need the density of gasoline. 2.0cm³), 61(not enough information to answer, we need the mass of the 13 brass spheres in order to use the density of brass. We could presume that the density of water was 1.0g/cm³, but this alone is not enough information.) 62(see 61, need mass of brass spheres), 63(2.0mL of water displaced. The 13 was not needed), 64(2.0g of water if we use that the density of water =1.0g/cm³), 65(The total mass of the brass spheres is 17.0g which would displace 2.0cm³ of water or 2.0g of water), 66(2.0g of water corresponds to 2.0cm³ volume displaced by the brass spheres. The ratio of the mass of the spheres to the volume displaced gives the density of brass given in questions 64 and 65), 67(107g), 68(0.811mol, yes we worked 67 backwards), 69(107000g 811mol * 132.14g (NH₄)₂SO₄/ 1 mol (NH₄)₂SO₄), 70(C₆H₅), 71(The molar mass of the empirical formula C₆H₅ is 77.106g/mol. The ratio of the molar mass of the molecular formula to the empirical formula gives 4. This means that there are 4 empirical formula units in the molecular formula. The molecular formula is C₂₄H₂₀), 72(0.42m³ remember that conversion factors appear on the handout. One way is 1ft=30.48cm and 1cm=1x10⁻²m. These factors need to be applied (multiplied) 3 times each to cancel the cubic units in the original number), 73(2 significant digits. The subtraction is known to the nearest thousand because the precision of a measurement of 1000g is ±1000g. The numerator is 57,200g ±1000g or 2 SD. Dividing gives 5.72g/cm³. With 2 significant digits this would be reported as 5.7g/cm³)