

Review for Exam 1

This is NOT a practice exam, it is a review of some of the things that we have learned. All numerical answers should include the correct unit and the correct number of significant figures.

**For this exam, omit problems: 1, 3, 9d, 15, 19

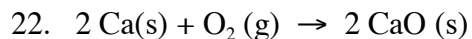
Naming problems

1. Name the following compounds. More information is on pages 89-95. N_2O_4
 - a) $NaHSO_4$
 - b) $Cr_2(CO_3)_3$
 - c) C_3H_8
 - d) SO_2
 - e) $Cu(CN)_2$
 - f) $AgCl$
2. When you heat popcorn, it pops because it loses water explosively. Assume a kernel of corn, with a mass of 0.125 g has a mass of .106 g after popping. a) What is the percent mass lost of the popcorn? b) If 0.125 g is the average mass of a kernel of popcorn, how many kernels are in 1.00 lb of popcorn? c) If you had 0.782 pounds of popcorn, how much would the popped corn weigh, not including the container, on average?
3. Give the correct formula for each of the following compounds.
 - a) potassium hypoiodite
 - b) magnesium chloride
 - c) calcium hydroxide
 - d) iron (II) oxide
 - e) iron (III) oxide
 - f) potassium permanganate
 - g) cobalt(II)chloride dihydrate
4. Copper has a density of 8.94 g/cm^3 . An ingot of copper with a mass of 57 kg (125 lbs) is drawn into a wire with a diameter of 9.50 mm. What length of wire (in meters) can be produced? The volume of a cylinder is $V = \pi r^2 h$ where h=length or height.
5. Give one examples of each:
 - a) a heterogeneous mixture that is entirely in the liquid state.
 - b) a homogeneous mixture in the gas state
 - c) a heterogeneous mixture made up entirely of elements.
 - d) a heterogeneous mixture made up entirely of compounds.
6. Distinguish between the two terms: physical property and physical change.
7. Distinguish between the two terms: physical change and chemical change.

8. If a correct or theoretical (reference book) value for the density of pyrite is 5.00 g/cm^3 , create a sample set of data that illustrates data that is precise, but not accurate. You should have at least 5 data points.
9. a) If you have a single atom of nickel that has a mass of 58 amu, how many protons, neutrons and electrons does the atom contain? b) Write the nuclear symbol of the atom of nickel described in a). c) Write a nuclear symbol of an isotope of nickel. d) How many protons, neutrons, and electrons would the atom of nickel contain if nickel became an ion? (what would a typical charge be for a transition metal?)
10. How many oxygen atoms are there in 12.5 g of potassium sulfate?
11. How many perchlorate ions are there in 8.374 g of magnesium perchlorate?
12. If a compound were dissolved in water, and it was found to contain 2.34×10^{21} sodium ions, how much sodium sulfite (Na_2SO_3), in grams, would have to have been dissolved, assuming that all of the sodium ions came from this compound?
13. When using the periodic table, we will adopt the group numbering system of 1-18 in which the group starting with H is group 1, the group starting with iron is 8 and the noble gases are group 18. a) What is the element in group 17, period 4. Write the name and the symbol. What is the state of this element at room temperature and pressure? Is it a metal or a nonmetal? b) What is the particulate structure of chromium? c) What is the particulate structure of xenon? What is the group and period in which xenon is found? d) Give one example of an alkaline earth metal.
14. Balance the following equation below. If a student starts this reaction with 12.567 g of Na_2SiO_3 (sodium silicate, a compound in glass), a) how much sodium fluoride can be formed, in grams? b) How many fluoride ions can be formed?



15. Balance the following equation and include the states.
Gaseous sulfur dioxide combines with solid calcium carbonate and oxygen gas to form solid calcium sulfate and carbon dioxide gas.
16. Draw one face of the Face-centered cubic unit cell, the simple cubic unit cell and the body-centered unit cell.
17. In the face of your face centered unit cell, draw an atom in an octahedral site. a) How many atoms (or ions) surround the atom in the octahedral site, in three dimensions. b) What part of the atom is entirely within one unit cell.
18. We have learned about two types of interstitial sites, the tetrahedral and the octahedral. If a single atom were placed in the center of a simple cubic cell, would that atom be in a tetrahedral site, an octahedral site, or some other type of site? Explain.
19. What is the difference between the bonding in an ionic lattice and the bonding in a diamond?
20. How does the unit cell structure relate to the density of the substance? Explain.
21. We saw a demonstration during which solid iodine was heated under low heat (approx. 50°C). As it was heated the iodine sublimed and then deposited on the ice-filled test tube. Describe your observations, and explain your observations by hypothesizing about what occurred at the molecular level. Instead of writing "molecular level", I could have written "atomic level": which term is more appropriate and why?



If you start with 4.20 g Ca and 2.80 g O₂, a) which is the limiting reactant, b) how many grams of CaO can be produced, and c) how much of the excess reactant is left over at the end of the reaction? Show ALL of your work!

	Ca (g)	O ₂ (g)	CaO (g)
Initial			
Change			
Final			

Answers to the Chemistry 1A math problems from the Review worksheet for Exam 1

2) a) 15% mass lost. b) 3,630 kernels c) 0.66 lbs.

4) 90. m

8) 4.27 g/mL , 4.21 g/mL, 4.19 g/mL, 4.22 g/mL, 4.21 g/mL

9) a) 28 protons, 28 electrons, 30 neutrons

b) Ni (58 superscript), (28 subscript)

c) Ni (60 superscript), (28 subscript)

d) 28 protons, 26 electrons, 30 neutrons (+2 ion)

10) 1.73×10^{23} atoms O

11) 4.518×10^{22} ClO₄⁻

12) 0.245 g Na₂SO₄

14) The equation coefficients are 1, 8 → 1, 2, 3 a) 8.6453 g NaF b) 1.2399×10^{23} F⁻

15) $2 \text{SO}_2 \text{(g)} + 2 \text{CaCO}_3 \text{(s)} + \text{O}_2 \text{(g)} \rightarrow 2 \text{CaSO}_4 \text{(s)} + 2 \text{CO}_2 \text{(g)}$

22) a) Ca b) 5.88 g CaO c) 1.12 g O₂