

ON SEPARATE PAPER, work each of the following problems. SHOW ALL WORK in **neat** form TO RECEIVE CREDIT!
Due: Day/Time of final (Mon. Dec. 9, 9:00–10:50 a.m.).

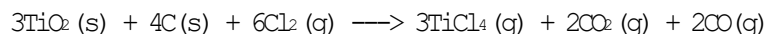
1. Ethyl alcohol has a density of 0.789 g/cm³. What volume of ethyl alcohol must be poured into a graduated cylinder to give 19.8 g of alcohol?

2. Write net ionic equations for the following molecular equations. Be Careful on **WEAK ACIDS**.

- HF(aq) + KOH(aq) → KF(aq) + H₂O(l)
- AgNO₃(aq) + NaBr(aq) → AgBr(s) + NaNO₃(aq)
- CaS(s) + 2HBr(aq) → CaBr₂(aq) + H₂S(g)
- NaOH(aq) + NH₄Br(aq) → NaBr(aq) + NH₃(g) + H₂O(l)
- H₂SO₄(aq) + NaOH(aq) →

3. Seawater contains 0.00065% (by mass) of bromine. How many grams of bromine are there in 1.00 L of seawater? The density of seawater is 1.025 g/cm³.

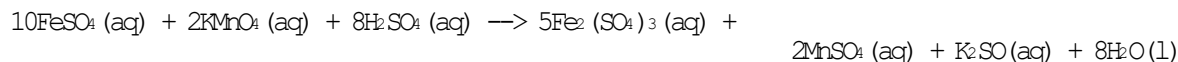
4. Titanium, which is used to make airplane engines and frames, can be obtained from titanium tetrachloride, which in turn is obtained from titanium dioxide by the following process:



A vessel contains 4.15 g TiO₂, 5.67 g C, and 6.78 g Cl₂. Suppose the reaction goes to completion as written. How many grams of titanium tetrachloride can be produced.

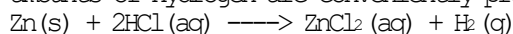
5. How many grams of sodium dichromate, Na₂Cr₂O₇, should be added to a 50.0-mL volumetric flask to prepare 0.025 M Na₂Cr₂O₇ when the flask is filled to the mark with water? What are the Molarities of the Na⁺ ion and the Cr₂O₇²⁻ ion in the solution?

6. How many milliliters of 0.238 M KMnO₄ are needed to react with 3.36 g of iron(II) sulfate, FeSO₄? The reaction is as follows:



7. A 1.28-g sample of a colorless liquid was vaporized in a 250-mL flask at 121°C and 786 mmHg. What is the molecular weight of this substance?

8. Small amounts of hydrogen are conveniently prepared by reacting zinc with hydrochloric acid.



How many grams of zinc are required to prepare 2.50 L H₂ gas at 765 mmHg and 22°C?

9. The atmosphere in a sealed diving bell contained oxygen and helium. If the gas mixture has 0.200 atm of oxygen and a total pressure of 3.00 atm, what is the pressure due to He? Calculate the mass of helium in 1.00 L of the gas mixture at 20°C.

10. Determine the amount of heat needed to raise 20.0 g of ice at 0°C to steam at 100°C.

