

He who can, does.
He who cannot, teaches.
--G.B. Shaw

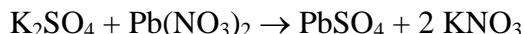
Unit 2 Sample Test

The test will include 5 multiple choice questions, 3 required problems, your choice of one out of two options and one essay question.

Beginning with this test you will be expected to master the solubility rules gradually. **You need to know Rule 1 this time.** The others will be given. The activity series will also be provided to assist you in determining whether or not certain redox reactions are likely to occur. And of course a periodic table will be provided.

The following are representative of typical multiple choice questions but do not necessarily indicate topics to be addressed on your actual test.

_____ 1. In the reaction below which takes place in aqueous solution



how many moles of soluble product are formed for each mole of lead(II) nitrate?

- a. 0 b. 0.5 c. 1 d. 2

_____ 2. In a balanced equation which of the following is *always* conserved?

- a. ions
b. molecules
c. moles of molecules
d. moles of atoms

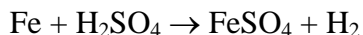
_____ 3. In the halogen family, which is the most reactive element (i.e., which will replace all others in a reaction)?

- a. F b. Cl c. Br d. I

_____ 4. The reaction products of a typical mixture of acid and base include

- a. water
b. a salt
c. water and a salt
d. none of these

_____ 5. Which substance below is oxidized during the reaction shown?



- a. Fe
b. H_2SO_4
c. FeSO_4
d. H_2

The next section consists of representative problems which might be found in the required section. All students are expected to work on both of the required problems.

6. Magnesium metal, like most metals, reacts vigorously with mineral acids such as hydrochloric acid in a redox displacement reaction.

a. Write a balanced *molecular* equation for this reaction:

b. Write a balanced *net-ionic* equation for this reaction:

7. Permanganate ions react with oxalate ions ($\text{C}_2\text{O}_4^{2-}$) in an acidic solution. Among the products are Mn^{2+} and CO_2 . Write the balanced redox reaction between these two ions in an acidic solution:

If 50 drops of the $\text{C}_2\text{O}_4^{2-}$ solution was titrated with permanganate solution until the purple color of the permanganate solution persisted, how many drops of permanganate solution was used? (assume that the solutions of ions were of equal concentrations)

8. Some of the substances commonly used in over-the-counter preparations for neutralizing excess stomach acid include $\text{Mg}(\text{OH})_2$ and $\text{Al}(\text{OH})_3$.

Write a balanced *net-ionic* reaction for the neutralization of each by hydrochloric acid, assuming that the original bases are insoluble solids.

9. One of the three metals, **X**, **Y**, **Z** is Sn. Consider the data below for displacement reactions and determine which metal is Sn (the activity series--*provided on the test*--on p. 108 will be helpful)

	Co	Y	X	Cu	Z
H ⁺	x	x	x		x
Z ²⁺	x				
Cu ²⁺	x	x	x		
X ²⁺	x				
Y ²⁺	x				

["x" indicates that a reaction has taken place]

Write the balanced *net-ionic* equation for any ONE of the reactions indicated above:

The next section consists of representative problems such as might be found in the "options" section. Each student is expected to select one problem from this section to work on. Note that the test will include solubility rules 2-7 along with the usual periodic table and the activity series.

10. In order to decide whether a solution contains SO₄²⁻, Cl⁻, and/or S²⁻, a student adds Pb²⁺ to one portion and Ba²⁺ to another. A precipitate forms with Pb²⁺ but not with Ba²⁺. Using the solubility rules, what can you determine about the contents of the solution?

11. Write the balanced molecular equation for the reaction of phosphoric acid with potassium hydroxide:

If solutions of equal concentration are mixed, how many drops of potassium hydroxide will be required to make 100 drops of phosphoric acid with bromthymol blue added turn green?

The final section of the test will consist of one essay question selected from the following topics:

electrolyte behavior in reactions taking place in solution
 lab equipment (glassware, etc.)
 applications of the activity series

[Answers](#)