Solution stoichiometry problems.

MnO4- + 8 H+ + 5 Fe2+ = Mn2+ + 5 Fe3+ + 4 H2O

10.0mL, 2.00M 100.mL

The amount of Fe2+ in a sample can be determined by titrating with KMnO4  in acid, as shown in the balanced equation. 1. Why is the K+ ion from the KMnO4 left out of the balanced equation?

2. What is being oxidized? 3. What is being reduced? ( Mn+7, but it is also OK to say “MnO4- “ is reduced. When the species reduced or oxidized is PART of a polyatomic ion, we often say that the entire ion is reduced or oxidized, rather than just one atom in it.)

4. 10.0 mL of 2.00 molar KMnO4 were required to completely react 100. mL of a solution containing some Fe2+ What is the molarity of the Fe2+ solution? 0.0100L ( 2.00M) = 0.0200 mol MnO4- .

1. How many MOLES of the KMnO4 were used in the titration? ( 0.0200 mol)
2. How many MOLES of Fe2+ ions reacted with that much KMnO4 ( 0.100 mol)
3. What is the MOLARITY of the Fe2+ solution? ( 1.00 molar)
4. What is the minimum number of moles of H+ required? ( 0.0200 x 8 = 0.160)
5. How many mL of 8.00 molar HNO3 would be needed to provide the necessary H+?

 ( 0.160 mol x 1.00L/8.00mol = 0.0200 L or 20.0 mL OR, since M = mol/L , we can solve for liters L = mol/M. 0.160 mol/8.00mol/L = 0.0200 L)

Than, give a SIMILAR problem like this one…

 x 0.200mol

3 Cu + 8 H+ + 2NO3- = 2 NO + 3 Cu+2 + 4 H2O

1. What was reduced in this reaction?
2. If it required 50.0 mL of a solution that is 4.00 M in H+ to completely react the Cu, what was the mass of the Cu ? ( 63.5= molar mass)0.075 mol Cu.

 0.075 mol ( 63.5g/mol) = 4.76 g