Massive Oxidation Number Assignment

Assign the oxidation numbers of all the elements in the following substances:

1. Sulphur compounds:
   a. SO_2 S = +4 O = -2
   b. SF_6 S = +6 F = -1
   c. H_2SO_4 H = +1 S = +6 O = -2
   d. H_2S H = +1 S = -2
   e. Na_2SO_3 Na = +1 S = +4 O = -2
2. Chlorine compounds:
   a. KCl K = +1 Cl = -1
   b. $NaClO_3$ Na = +1 Cl = +5 O = -2
   c. Cl_2O Cl = +1 O = -2
   d. ICl_5 I = +5 Cl = -1
   e. Cl_2O_7 Cl = +7 O = -2
3. Nitrogen compounds:
   a. N_2O N = +1 O = -2
   b. NO N = +2 O = -2
   c. N_2O_4 N = +4 O = -2
   d. NH_3 N = -3 H = +1
   e. HNO_3 H = +1 N = +5 O = -2

4. Carbon compounds:

   a. CH_4 C = -4 H = +1

   b. C_2H_4 C = -2 H = +1

   c. $HCOOH$ H = +1 C = +2 O = -2

   d. CO_2 C = +4 O = -2

   e. CH_2Cl_2 C = 0 H = +1 Cl = -1

5. Manganese compounds:

   a. MnO_2 Mn = +4 O = -2

   b. $MnBr_2$ Mn = +2 Br = -1

   c. Mn_2S_3 Mn = +3 S = -2

   d. $KMnO_4$ K = +1 Mn = +7 O = -2

   e. Na_2MnO_4 Na = +1 Mn = +6 O = -2

6. Vanadium compounds:

   a. $VOSO_4$ V = +4 O = -2 S = +6

   b. VCl_2 V = +2 Cl = -1

   c. VO_2NO_3 V = +5 O = -2 N = +5

   d. V_2O_3 V = +3 O = -2

   e. $VOCl_2$ V = +4 O = -1 Cl = -1

7. Iridium species:

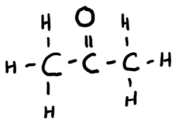
a. $[IrO_4]^+$ Ir = +9 O = -2

b. $IrSe_2$ Ir = +4 Se = -2

c. IrO_4 Ir = +8 O = -2

d. $IrCl_2$ Ir = +2 Cl = -1

e. Ir_4F_{20} Ir = +5 F = -1

8. Propanone has the structure: 

What is the oxidation state of C in this molecule? Is that possible? How can it be explained? H = +1, O = -2 ⇒ +4 ∴ C total = -4

∴ each C = -4/3

not possible as C can't gain 4/3 electrons

-4/3 is average ox state of C.

The C attached to O must have a different OX state than the other 2 C atoms

Extension

9. Using the periodic table as a guide, what would you EXPECT to be the **four** most common oxidation states for Iodine? Why? 0, -1, +5, +7 — lose all e in outer shell

I_2 as element

I^- ion

lose 5e in p subshell