

Compound HW #4 transitional metal compounds name: ANSWERS

Transitional metals make cations. Many can make more than one kind of stable cation, which is very different from groups 1 and 2 and aluminum. To tell if one of these

transitional metals can make more than one possible cation we will examine the oxidation numbers in each box. If there are more than one + oxidation number, then each of these positive oxidation numbers are the possible cation charges. We use the roman numerals to show which cation is making the particular compound. Look at your periodic table now.

Atom 23, vanadium has +2, +3, +4 and +5 for oxidation numbers. That means that vanadium can make V^{+2} , V^{+3} , V^{+4} , or V^{+5} cations. Zinc is atom number 30, it has just one oxidation number, it can only make a Zn^{+2} cation.

Zinc can combine with an anion, say O^{-2} , in just one way to become a neutral ionic compound: ZnO. With a transitional metal with only one possible cation, there is no need to show "which" cation is being used in the compound, there is NO CHOICE>

Vanadium can combine with oxygen in four ways, VO, V_2O_3 , VO_2 , and V_2O_5 . Each of these four compounds can't be named vanadium oxide. They each need their own name since they are four different compounds, with four different ion ratios, and four sets of properties. To handle this situation the Stock naming system exists. It's also called the roman numeral naming system (more casually). To name these four, we use the roman numeral that matches the ion charge, so in order:

The V^{+2} cation makes VO called vanadium (II) oxide.

The V^{+3} cation makes V_2O_3 called vanadium (III) oxide.

The V^{+4} cation makes VO_2 called vanadium (IV) oxide.

Finally, the V^{+5} cation makes V_2O_5 , which is called vanadium (V) oxide.

Name these compounds from their formulas on the left, then write the proper formula for the compounds named on the right side.

$CuSO_4$	copper (II) sulfate	tin (IV) fluoride	SnF_4
Ni_2O_3	nickel (II) oxide	niobium (V) phosphide	Nb_3P_5
PbO_2	lead (IV) oxide	bismuth (III) chloride	$BiCl_3$ 😊
PbO	lead (II) oxide	iron (III) oxide	Fe_2O_3
$TiCl_4$	titanium (IV) chloride	iron (II) oxide	FeO
CrO_3	chromium (VI) oxide	gold (I) sulfide	Au_2S
MnS_2	manganese (IV) sulfide	gold (III) selenide	Au_2Se_3