

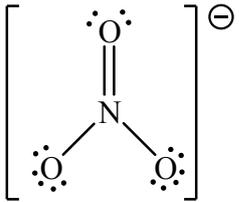
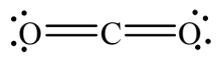
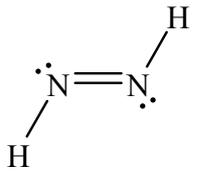
- Complete the following table. Give, as required, the formula, the systematic name, the oxidation number of the underlined atom and, where indicated, the number of *d* electrons for the element in this oxidation state.

Marks
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FORMULA	SYSTEMATIC NAME	OXIDATION NUMBER	NUMBER OF <i>d</i> ELECTRONS
<u>S</u> O ₃	sulfur trioxide	+IV	0
K <u>Mn</u> O ₄	potassium permanganate	+VII	0
<u>Co</u> Cl ₂ ·6H ₂ O	cobalt(II) chloride-6-water	+II	7
NH₄SO₄	ammonium sulfate		

- Draw the Lewis structures, showing all valence electrons for the following species. Indicate which of the species have contributing resonance structures.

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NO ₃ ⁻ 	CO ₂ 	N ₂ H ₂ 
Resonance: <u>YES</u> / NO	Resonance: YES / <u>NO</u>	Resonance: YES / <u>NO</u>

- A sample of carboxypeptidase (an enzyme) was purified and found on analysis to contain 0.191% by weight of zinc. What is the *minimum* molecular weight of the enzyme if we assume it is a monomer?

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The minimum molecular weight corresponds to the enzyme containing only one zinc atom per molecule, or one mole of the enzyme contains one mole of zinc. The percentage of zinc is given by:

$$\text{percentage zinc} = \frac{\text{atomic mass of zinc}}{\text{molar mass of enzyme}} \times 100 = 0.191$$

As the atomic mass of zinc is 65.39 g mol⁻¹, this can be rearranged to give the molar mass of the enzyme:

$$\text{molar mass of enzyme} = \frac{65.39}{0.00191} = 3.42 \times 10^4 \text{ g mol}^{-1}$$

Answer: **3.42 × 10⁴ g mol⁻¹**

