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TOPIC - AN INTRODUCTION TO THE TRANSITION ELEMENTS

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COLOUR

Many ionic and Covalent Compounds of transition elements are Coloured. In Contrast Compounds of the s- and p-block elements are almost always white. when light passes through a material it is deprived of those wave lengths That are absorbed. If absorption occurs in the visible region of the Spectrum, The transmitted light is coloured with the Complementary Colour to the Colour of the light absorbed. Absorption in the visible and UV regions of the spectrum is caused by changes in electronic energy. Thus the spectra are Sometimes called electronic Spectra. (These Changes are often accompried by much Smaller Changes in Vibrational and rotational energy.) It is always possible to promote an electron from one energy level to another. However. the energy jumps are Usually so large that the absorption lies in the UV region. Special circumstances Can make it possible to obtain Small jumps in electronic energy which appear as absorption in the visible region.

polarization

NaCl, NaBr and NaI are all ionic and are all Colourless. AgCl is also colourless.

Thus the halide ions Cl^- Br^- and I^- and the metal ions Na^+ and Ag^+ are typically colourless. However AgBr is pale yellow and AgI is yellow. The colour arises because the Ag^+ ion polarizes the halide ions. This means that it distorts the electron cloud, and implies a greater covalent contribution. The polarizability of ions increases with size. Thus I^- is the most polarized, and is the most coloured for the same reason Ag_2CO_3 and Ag_3PO_4 are yellow. and Ag_2O and Ag_2S are black.

Incompletely filled d or f shell

Colour may arise from an entirely different cause in ions with incomplete d or f shells. This source of colour is very important in most of the transition metal ions.