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We have already met with complexes or coordination compounds in our daily lives. We encounter them as colors, such as Prussian blue, and they are essential for the processes of life that take place in our bodies. Complexes play a central role in various large-scale technical processes. Examples include cyanide leaching, the production of high-purity aluminum oxide using the Bayer process, or the purification of nickel using the Mond process. Different stabilities and solubilities of complexes are applied in the separation of metals, including the increasingly important rare earth metals, which are vital for many of the high-performance electronic devices we use every day. The preparation of polymers under mild conditions would be unthinkable without the use of organometallic complexes as catalysts. And also the qualitative and quantitative analysis of metal ions in the laboratory of studies or in some cases directly in the field is not possible without the use of complex-forming reagents, which are used to detect, identify, and separate metal ions. To get started, let us consider the following examples:

1. Why does the addition of NaOH to an Al^{3+} solution first yield a precipitate that dissolves again on further addition? (Bayer process for the purification of bauxite for the preparation of aluminum)
2. Why does AgCl dissolve when NH_3 is added? (Detection of chloride ions)
3. Why is anhydrous $CuSO_4$ colorless, an aqueous solution light blue, while Cu has a red or light green? Why does a precipitate form on the addition of NH_3 which dissolves with deep blue color on further addition of NH_3 ? (Fig. 1.1)

We look at the reaction equations for the processes and questions mentioned so far and the complexes that appear in them.