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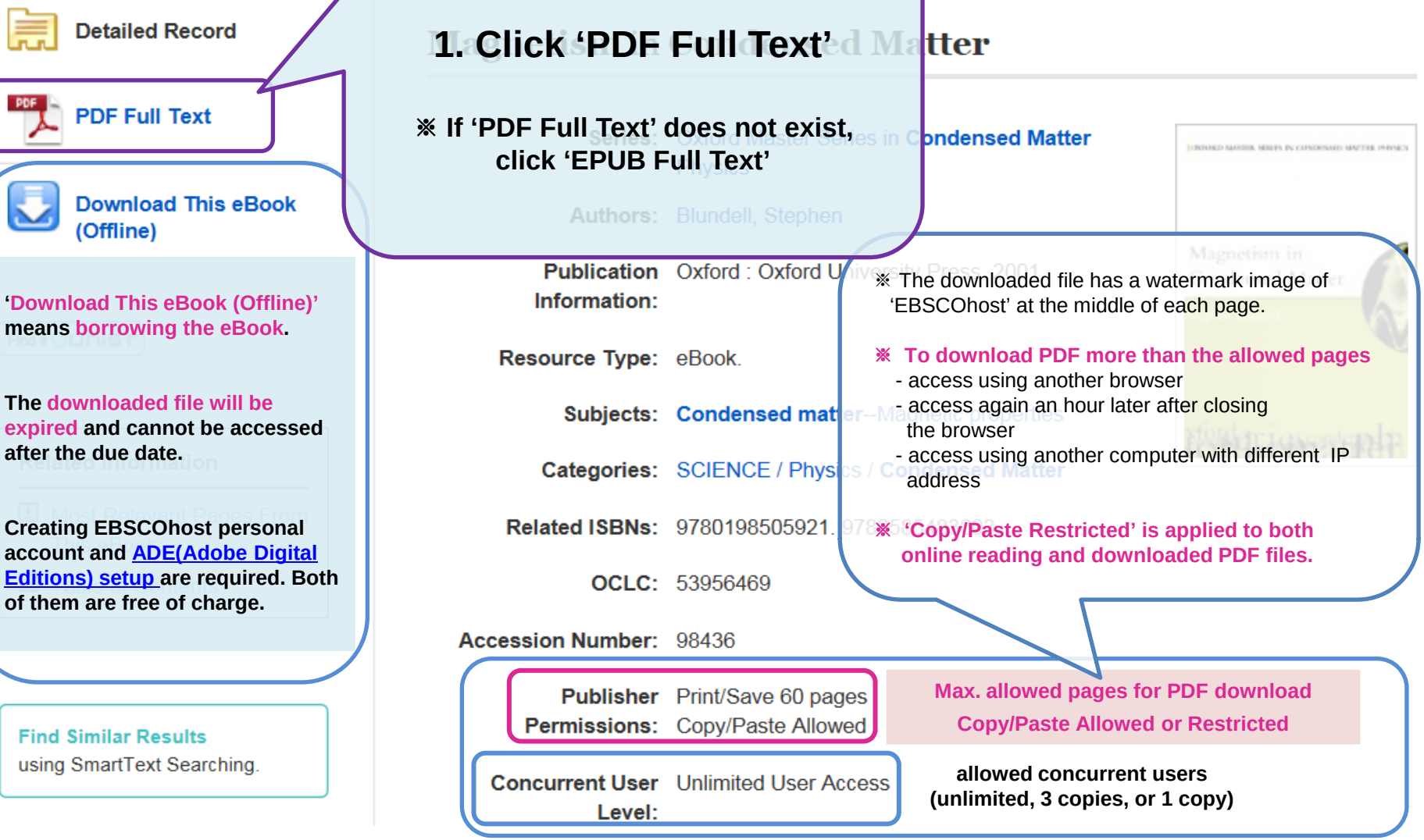

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Electrochemical Systems

Author: Newman, John S., Thomas-Alyea, Karen E.

Date: 2004

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THERMODYNAMICS OF ELECTROCHEMICAL CELLS

For a discussion of the thermodynamics of electrochemical cells, we first need to introduce free energies, chemical potentials, and activity coefficients. If we restrict ourselves to electrodes in equilibrium with the solution adjacent to them, then the cell potential can be obtained by combining equilibrium terms of the electrochemical potentials of species in the electrodes and in the solutions. The condition of phase equilibrium precludes the passage of anything but an infinitesimal current; it also precludes the possibility of the occurrence of spontaneous reactions that require no net current. Under certain conditions it is possible, however, to have more than one reaction simultaneously in equilibrium.

In all but the simplest cells, the expression of the phase equilibria does not lead to an immediately useful result. The solutions adjacent to the two electrodes of a cell usually have different compositions, and in order to preclude spontaneous reactions at the electrodes, it is necessary to prevent the reactants for one electrode from

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Magnetism in Condensed Matter

Author: Blundell, Stephen
Date: 2001
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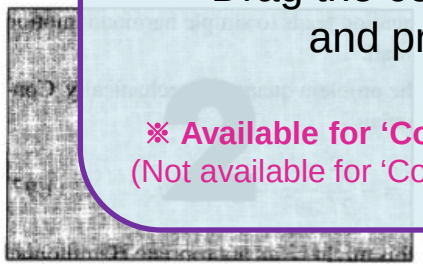

Isolated magnetic moments

In this chapter the properties of isolated magnetic moments will be examined. At this stage, interactions between magnetic moments on different atoms, or between magnetic moments and their immediate environments, are ignored. All that remains is therefore just the physics of isolated atoms and their interaction with an applied magnetic field. Of course that doesn't stop it being complicated, but the complications arise from the combinations of electrons in a given atom, not from the fact that in condensed matter there is a large number of atoms. Using this simplification, the large number of atoms merely leads to properties like the magnetic susceptibility containing a factor of n, the number of atoms per unit volume.

2.1 An atom in a magnetic field

In Section 1.1 (see eqn 1.35) it was shown that an electron spin in a magnetic field parallel to the z axis has an energy equal to