# Lithium-ion rechargeable batteries – answers

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## Chemistry of lithium-ion batteries

* 1. Lithium can produce a high voltage in cells.

Lithium has a low density so can help produce portable equipment.

* 1. The reactions in the cell stop because one of the reactants runs out.
	2. The reactions in the cell are reversible.

When the cell is recharged the reverse reaction occurs.

* 1. Any one from:
* Metal/metal compounds are reused.
* Supplies are not depleted.
* The cell can be reused.
* No landfill problems.
* Less mining.
* Less energy to extract metals.
* Less waste.
	1. A battery is made from two or more cells are connected together in series.

**01.6** Li 🡪 Li+ + e-

**01.7** Sodium loses an electron more easily.

Sodium’s outer electron in energy level further from nucleus.

Sodium’s out electron less strongly attracted by nucleus.

**01.8** The water could react with the lithium metal.

## Life cycle assessment for lithium ion batteries.

**02**

* Mining could damage the landscape.
* Mining could displace indigenous populations.
* Processing lithium could use up water needed by population.
* Energy usage in mining process.

**03.1**

* In reuse the batteries could be used in second-use applications, eg in community storing of electricity generated by solar or wind power.
* In reuse the battery is still working as a battery.
* In recycling the battery is dismantled and the components are separated.
* The different components are then used again.

**03.2**

* Many old batteries are kept by owners or thrown away and end up in landfill.
* There are many different components in the batteries that are hard to separate.
* The batteries have many different designs.

**03.3**

* Legislation could mean the batteries have the same design.
* This would make it easier to recycle.

**03.4**

* To prevent resources being wasted.
* Lithium may run out.
* Batteries can cause pollution problems if disposed in landfill.
* Less energy and water to extract metals.