

# RECYCLING RATES OF SMARTPHONE METALS

COLOUR KEY: ● < 1% RECYCLE RATE ● 1-10% RECYCLE RATE ● 10-25% RECYCLE RATE ● 25-50% RECYCLE RATE ● > 50% RECYCLE RATE ● ● NON-METAL (OR RECYCLE RATE UNKNOWN)

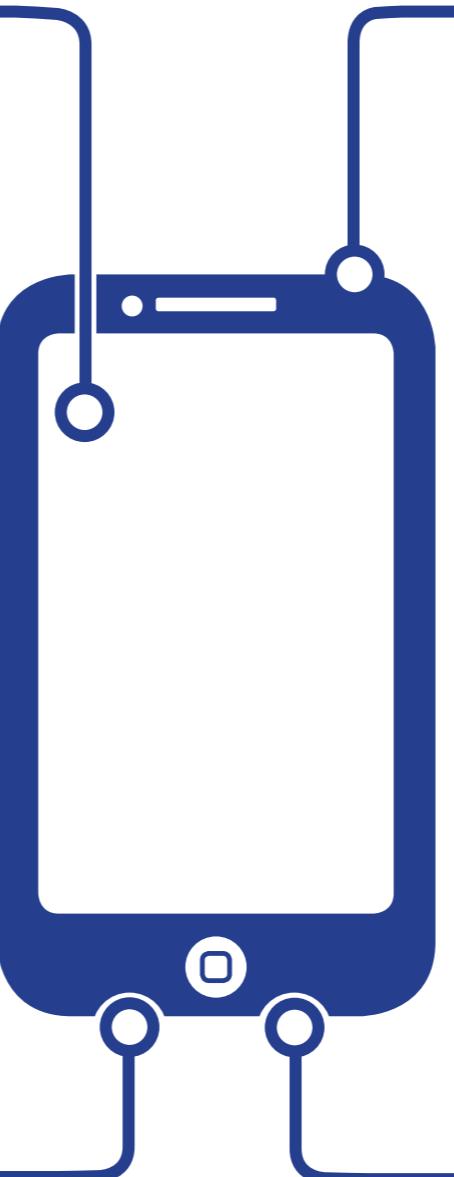
## SCREEN



**TOUCH: INDIUM TIN OXIDE**  
Used in a transparent film over the phone's screen that conducts electricity. This allows the screen to function as a touch screen. This is the major use of indium.

**GLASS: ALUMINA & SILICA**  
On most phones the glass is aluminosilicate glass, a mix of aluminium oxide & silicon dioxide. It also contains potassium ions which help strengthen it.

**COLOURS: RARE EARTH METALS**  
A variety of rare earth metal-containing compounds are used to help to produce the colours in a smartphone's screen. Some of these compounds are also used to help reduce light penetration into the phone. Many of the 'rare earths' occur commonly in the Earth's crust, but often at levels too low to be economically extracted.



**WIRING & MICROELECTRONICS**  
Copper is used for wiring, and for micro-electrical components along with gold and silver. Tantalum is the major component in micro-capacitors.

**MICROPHONES & VIBRATIONS**  
Nickel is used in the microphone and for electrical connections. Rare earth element alloys are used in magnets in the speaker and microphone, and the vibration unit.

**THE SILICON CHIP**  
Pure silicon is used to manufacture the chip, which is then oxidised to produce non-conducting regions. Other elements are added to allow the chip to conduct electricity.

**CONNECTING ELECTRONICS**  
Tin & lead were used in older solders; newer, lead-free solders use a mix of tin, copper & silver.



## BATTERY



Most phones use lithium ion batteries, composed of lithium cobalt oxide as a positive electrode and graphite (carbon) as the negative electrode. Sometimes other metals, such as manganese, are used in place of cobalt. The battery casing is often made of aluminium.

Magnesium alloy is used to make some phone cases, whilst many others are made of plastics, which are carbon-based. Plastics will also include flame retardant compounds, some of which contain bromine, whilst nickel can be included to reduce electromagnetic interference.

