Markets (cont.)

coloured glass is stored, processed and re-manufactured separately.

The first step in re-manufacturing is to grind the glass into small pieces called cullet. Magnets and air are used in a process called beneficiation, to remove metal, paper and other contaminants. From here the clean cullet is sent to the furnace where it is mixed with sand, limestone and soda ash used in the making of new glass. For clear glass 20% to 30% cullet is added to the virgin material. If sufficient quantities of cullet could be found, clear glass could be made from 100% recycled material. Green bottles can be made from nearly 70% coloured cullet. Upon exiting the furnace, new glass is mechanically shaped and finished into an array of bottles and jars.

Some glass by-passes the obvious avenue of becoming the same product. Fibre glass and reflective paint can both be derived from old containers. Glass can act as a substitute for a portion of the aggregate used in asphalt. Three million bottles could be used in paving a single lane more than one metre deep, for a distance of one kilometre. Recycled glass is also used in the making of *geotextiles,* which become items such as sewer pipes. Ground glass is useful as an abrasive in sandblasting processes, too. Coloured glass has been added to stucco allowing the wall covering to be applied in a variety of hues.

Metals (See HANDOUT: **Metal Process Flow Chart** D55)

The generic name for waste metals is scrap. Scrap can be generated at the mill or foundry (home scrap), during the manufacturing of metal products (industrial scrap) or from worn and discarded good (obsolete scrap). In the context of recycling we will divide scrap metal into four classes: tin, steel, aluminium and other metals.

Most people associate the word tin with food cans. However, a "tin can" is actually made of steel and has a very thin protective coating of tin or other food-safe material. Removing this coating starts with the cans being washed in a strong *caustic soda* solution. The tin and unwanted contaminants are dissolved. The steel cans are removed, quadruple rinsed, then compressed into 230 kg bales. A conveyor delivers the bales to rail cars, bound for steel mills.

Meanwhile, the detinning solution is constantly filtered to remove tin crystals and other impurities. The tin crystals are re-dissolved in water and then sent to a purification stage where grease, heavy metals, organic material or other unwanted items are removed. The purified solution is now sent to one of two processes.

In the tin electrowinning process, negatively charged chains (cathodes) are lowered into the solution. As the electric current passes through the solution the tin is attracted by and adheres to the chains. The cathodes are then removed and dipped in a vat of molten tin where, because of the different melting points, the recovered tin dissolves but the chains remain intact. The metal is then formed into 30 kg ingots.

For the tin chemical process, the solution is neutralized to produce a tin oxide powder. This powder is water washed to remove impurities and then chemically converted to either potassium or sodium stannate, which are used to plate tin onto automobile and electrical equipment and the Canadian dollar coin.