Processing materials.

Many materials are considered to be raw materials and are used to make up other materials and products.

Here are the raw materials for making a cake.

This is what the processed product (the cake) looks like – completely different – after processing (cooking). It also tastes great!

Other raw materials for making things could even include sand, clay, coal & oil. There are many more, too.

1

Combining materials.

Here are some important key words & their meanings for this section.

- Combine – join together
- Ingredients – raw materials for product
- Processed – new products & properties formed
- Products – something new after a process
- Mixture – made by mixing raw materials
- Cement – clay+limestone becomes hard when mixed with water

Concrete – mixture of sand, gravel, cement and water
Reinforced – strengthened by adding other materials to make stronger
Plaster of Paris – white powder that becomes hard after water is applied
Paste – thick mixture of solid and water
Dissolve – mixes completely with water
Rural – far from big cities where people live off what is available there

2

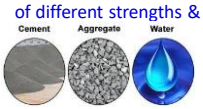
Mixing and setting.

When some substances are mixed – particularly when water is involved, they can become useful when allowed to set.

Cement, when mixed with water, becomes runny but may become harder when allowed to set.

Cement mixtures can make hollow circular & square pillars to make silos or power stations.

When cement is also mixed with sand, gravel, stone and water in different ratios we get concrete of different strengths & for different uses.



Cement + sand + stone + water ➔ Concrete

3

Mixing and setting.

Mixing Plaster of Paris:

Gypsum is mined from rocks, heated & ground to form Plaster of Paris – used to fix broken arms and legs, when mixed with water and then sets very hard.

Plaster of Paris can also be used in molds to form ornaments that can be painted, once hard and dry.

Polyfiller is used to fill cracks in walls when mixed with water.

4

Mixing a solid and a liquid into a paste.

A powdery solid when mixed with water forms a paste.

A paste is a stiff mixture of solid and liquid.

When a little water is mixed with powdery flour, a sticky paste is formed that can be used as a glue.

Mixing & cooking.

Ground mealie seeds becomes maize meal & when mixed with a little water and cooked, you produce tasty porridge that is easy to digest.

5

Mixing, heating & then cooling.

When milk, cream and sugar are mixed & allowed to cool in a freezer, it solidifies to form ice cream.

Jelly powder dissolves in hot water and will set to become a wobbly jelly, once set in a fridge.

6

Mixing, drying and firing.

Mixing clay with water, allowing to dry out and then heating to very high temperatures is the basic way bricks are made.

In rural areas, straw, dry grass and/or animal dung is mixed with clay & water to make smaller quantities & ensuring the bricks do not crack when they dry out.

Sundried mud bricks

Straw & dry grass mixed with clay & water

7

Industrial brick-making.

Industrial (large scale) brick-making - small rock particles are mixed with fine coal dust and water. Machines compress the wet mixture and shape the bricks after which they are dried and fired in kilns at 600° - 900° C
A kiln is a furnace or oven that dries, bakes or burns materials in order to process it.

Clay becomes hard when all the water has evaporated about 500°C and it becomes water-resistant, but brittle.

The different temperatures at which the bricks are fired, produce the different colours.

8

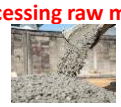
Summary of combining, mixing & processing raw materials

Plaster of Paris & water	Mix	Set	Ornament
Flour & water	Mix	paste	Glue
Clay Limestone & water	Heat	Grind	Cement
Jelly powder & water	Mix	Cooling	Solid jelly

9

Summary of combining, mixing & processing raw materials

Cement, sand, stone & water	Mix	Concrete			
Polyfilla & water	Mix	Paste	Fill cracks	Set	
Clay & water	Blocks	Dry in air	Heat in kiln	Bricks	
Maize meal, salt & water	Mix	Cook	Porridge		



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