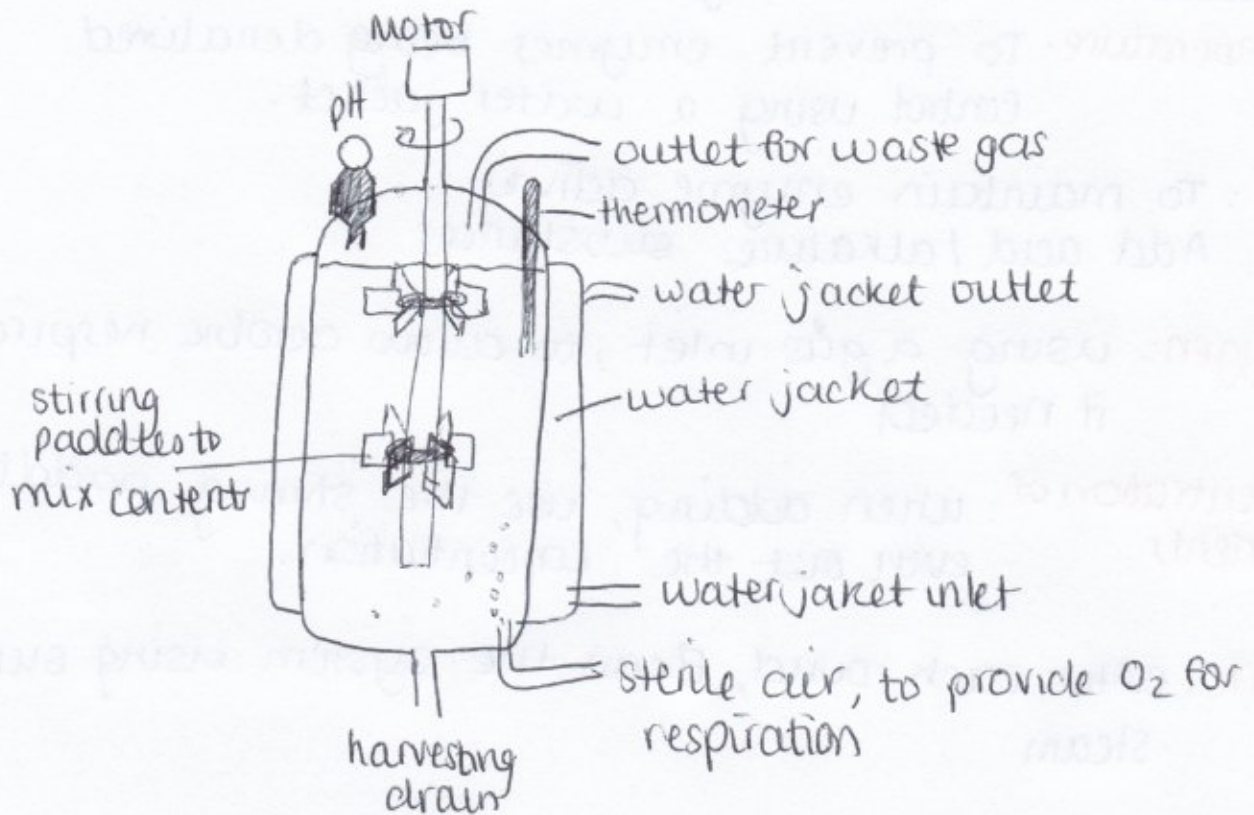


## A fermenter



### Fermentation:

- The culturing of microorganisms aerobically or anaerobically in fermentation tanks
- Substances are produced by the microorganisms and are extracted & treated

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### Metabolism:

#### Primary metabolite:

A substance required, which is produced by the organism, for normal growth

eg. enzymes, protein, ethanol, DNA etc

#### Secondary metabolite:

A substance produced by an organism that is not required for normal growth

eg. antibiotics (penicillin)

In fermenters, the conditions must be **Aseptic**, to remove any unwanted microorganisms that would reduce the yield of the product by contaminating it or competing for space (see later page)

# Polymerase chain

## Reaction

- ① DNA sample is mixed with DNA nucleotides and DNA polymerase, and is cut up to make small enough strands
- ② Heated to  $95^{\circ}\text{C}$ , so hydrogen bonds break, to make the sample single stranded
- ③ short single stranded primers are added
- ④ Temperature is reduced to  $55^{\circ}\text{C}$  so the primers can form hydrogen bonds & bind, to form small double stranded segments at either end of sample.
- ⑤ DNA polymerase binds to the double stranded section
- ⑥ Heated to  $72^{\circ}\text{C}$ , which is the optimal temperature of this enzyme. It adds free nucleotides to the strand to generate a new double strand
- ⑦ Enzyme detaches & process repeats
- ⑧ amount of DNA increases exponentially

### DNA polymerase:

- is thermophilic
- not denatured by high  $^{\circ}\text{C}$
- from thermophilic bacteria

## Gene therapy

Treating genetic disorders using molecular genetic technology

### Somatic gene cell therapy

- \* functioning allele of gene is inserted into target cells
- ∴ need techniques to get gene into target cell

"Ex vivo therapy"

⇒ cell removed, treated then replaced

### \* SHORT LIVED

- ∴ must be regularly repeated as cells don't divide + pass on allele
- \* Difficult to get allele into genome in a functioning state

### Germline gene cell therapy

- \* functioning allele inserted into germline cells
- ∴ easier delivery

- \* all cells contain copy of allele if derived from original + offspring contain a copy

### \* UNETHICAL

- don't know if allele is successfully introduced without any unintentional changes that could damage the envelope

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