Experiment No. 6 – Effect of Temperature

1. **In your words state the effect of pouring warm and then cold saline on the simple muscle curve.**

Ans:- Warm saline (≈ 40–45 °C):

- Amplitude (height) of twitch increases (stronger contraction).
- Latency (latent period) shortens and time to peak and relaxation are faster (contraction/relaxation become quicker).
- Mechanism: increased enzyme activity, increased cross-bridge cycling rate and faster nerve-muscle conduction.

Cold saline (≈ 0–8 °C):

- Amplitude decreases (weaker contraction).
- Latency increases (slower to start) and contraction & relaxation are slowed (longer time to peak and prolonged relaxation).
- Mechanism: slowed enzyme kinetics, slower ion channel gating and reduced nerve conduction velocity.

2. **What effect do you expect if the muscle is bathed in saline at 45 degree C?**

Ans:- High temperature, (say, 45 to 50°C and above) causes coagulation of muscle proteins, the muscle shortens, and goes into an irreversible state called “heat rigor”. Heat rigor does not occur in the body as such a high temperature is incompatible with life.

3. **Which tissue in the body is most sensitive to rise in temperature?**

Ans:- Central nervous system (brain) / nervous tissue is especially thermosensitive brain cells show functional and structural changes with relatively small temperature increases; clinically the brain is considered one of the most heat-sensitive tissues.

4. **What effect do you expect if the muscle is cooled up to 0° C?**

Ans:- Cold has opposite effects due to slowing down of chemical processes and increase in viscosity. If the temperature is reduced to 0°C or below, the excitability is lost.

Draw a diagram of the curve obtained in the space below.