**M1.**A

**[1]**

**M2.** (a) (i) *Reagent:* Hydrogen of $H_2$ **(1)**
*Conditions:* Ni (catalyst) *(Ignore Pt)* **(1)**
100 – 200 °C or heat **(1)**
*Not 'high temp' or 'warm'*
*M1 = 0, M2 = 1 then M3 = 0 max*
*or M1 = M2 = 0 then M3 = 0*
*M3 tied to M1. Only award M3 if M1 earned*

(ii) *Difference in structure:* soft margarine less hydrogenated or has more C=C bonds or is more unsaturated than hard margarine **(1)**
*Difference in melting point:* soft has lower melting point **(1)**
*Must be comparison*

**5**

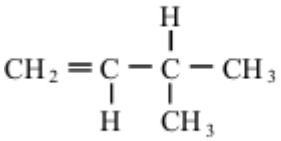
(b) (i) 3-methylbutan-2-ol **(1)**
*No alternatives*

(ii) elimination or dehydration **(1)**

(iii) (c) $H_2SO_4$ or (c) $H_3PO_4$ – name or correct formula **(1)**

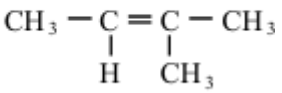
(iv)

*Alkene 1*



**(1)**

*Alkene 2*



**(1)**

*Double bond must be shown*
*Accept any correct unambiguous structures*
*if but- 1-ene and but-2-ene offered, allow M2*

**5**

**[10]**

**M3.**D

**[1]**

**M4.**D

**[1]**

**M5.**B

**[1]**

**M6.** (a) *Electrophile*: $e^-$ pair / lone pair acceptor or $e^-$ deficient species or $e^-$ seeking species **(1)**

*For 'species' accept atom, molecule, ion*
*NOT '+' ion*
*NOT 'attracted to '- ' charge'*

*Addition:* reaction which increases number of substituents or convert double bond to single bond or where two molecules form one molecule **(1)**

**2**

(b) (High) $e^-$ dense or $e^-$ rich C=C or $e^-$ rich $\pi$ bond or 4 $e^-$ between the C's **(1)**

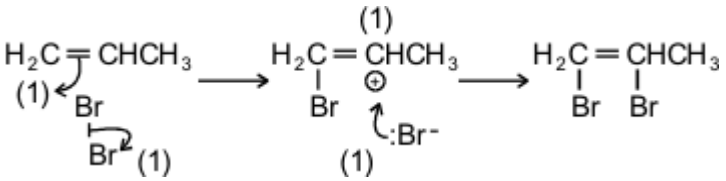
*NOT just 'C=C'*

causes induced dipole in $Br_2$ **(1)**

*Ignore refs to 'temporary'*
*can score M2 from $\delta^+$ / $\delta^-$ on $Br_2$ in (c) unless a contradicting error in (b)*

**2**

(c) *Mechanism:*




*If incorrect alkene, lose M3 (wrong cation)*
*Mark M4 conseq on M3*
If M1 curly arrow C=C allow

*Name of product:* 1,2-dibromopropane **(1)**

**5**

(d) addition **(1)**

*Not additional*

**1**

**[10]**