9.14) a) VERIFY THAT THE UNITS OF μ_B ARE $Amp \cdot m^2$.

b) VERIFY THAT $A \cdot m^2 = \frac{J}{T}$ USING $\vec{F} = q\vec{v} \times \vec{B}$

a) $\mu_B = \frac{e\hbar}{2m_e} \sim \frac{C \cdot (J \cdot s)}{kg} \sim \frac{C \cdot s}{kg}\left(N \cdot m\right) \sim \frac{C \cdot s \cdot m}{kg}\left(\frac{kg \cdot m}{s^2}\right)$

$\mu_B \sim \frac{C \cdot m^2}{s} \sim Amp \cdot m^2$ QED!

- YES, THE BOHR MAGNETRON IS IN $A \cdot m^2$!

b) VERIFY THAT $A \cdot m^2 = \frac{J}{T}$

FROM THE LORENTZ FORCE, $\vec{F} = q\vec{v} \times \vec{B}$,

$\Rightarrow F \sim qvB \sim C \cdot \frac{m}{s} \cdot T \sim \frac{C}{s} \cdot mT \sim Amp \cdot m \cdot T$

THE AMP IN TERMS OF TESLA IS

$N \sim A \cdot m \cdot T \Rightarrow A \sim \frac{N}{mT}$

THE UNITS OF MAGNETIC MOMENT ARE THEN

$\mu \sim A \cdot m^2 \sim \left(\frac{N}{mT}\right) m^2 \sim \frac{N \cdot m}{T} \sim \frac{J}{T}$ QED!

SO THE UNITS OF MAGNETIC MOMENT ARE $A \cdot m^2 = \frac{J}{T}$!