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Subject - Physics

PHYSICS VIAB EXPERIMENT-3 HALL EFFECT

Aim:- 1. To determine Hall voltage developed across the sample material

2. To calculate Hall Coefficient and Carrier Concentration of sample material.

Apparatus:- Two solenoids, Constant Current Supply, four probe, digital gauss meter, Hall effect apparatus.

Formula used:-
$$R_H = \frac{V_H \times t}{I \times B}$$

Where,

V_H = Hall voltage

t = thickness

I = Current

B = applied magnetic field.

$$R_H = \frac{1}{ne}$$

Where

n = number density of electrons

e = charge of electron.

Observation :-
Table 1 :-

Trial no.	Current	Magnetic field
1	1	0.1482
2	1.5	0.2223
3	2	0.2964
4	2.5	0.3706
5	3	0.4447
6	3.5	0.5188
7	4	0.5929
8	4.5	0.6670
9	5	0.7411

Table 2 :-

Trial No.	Magnetic field	Thickness	Hall (mA) Current	Hall Voltage	R_H	Carrier Concentration
1	0.1482	0.0001	1	28.756	0.019	3.2×10^{-20}
2	0.2223	0.0002	1.5	32.350	0.019	3.2×10^{-20}
3	0.2964	0.0003	2	38.341	0.019	3.2×10^{-20}
4	0.3706	0.0004	2.5	44.931	0.019	3.2×10^{-20}
5	0.4447	0.0005	3	51.160	0.019	3.2×10^{-20}
6	0.5188	0.0006	3.5	58.709	0.019	3.2×10^{-20}
7	0.5929	0.0007	4	65.727	0.019	3.2×10^{-20}
8	0.6670	0.0008	4.5	72.788	0.019	3.2×10^{-20}
9	0.7411	0.0009	5	79.877	0.019	3.2×10^{-20}

Result: Hall Coefficient of the material Germanium
 $= 0.019$

Carrier Concentration of the material Germanium
 $= 3.2 \times 10^{-20} \text{ m}^{-3}$

Precaution: 1. Note down readings properly
2. Check everything properly

Source of error: 1. Calculation may be incorrect
2. Connection must be proper.
3. Units may not be taken properly.