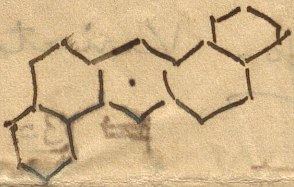
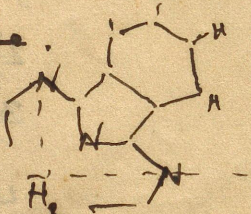
Graphite

1. Among elements C unique
100's of 1000's. of compounds.

2. not only composition but
also structure.





Phthalocyanin

Complement to intuition of
chemist:
inorganic all wrong.

3. aliphatic + aromatic

4. modern support:

5. Diamond + graphite
aliphatic. aromatic
(a) Size
(b) mellitic acid

6. Striking differences:
Hardness: graphite-

All due to metallic properties of graphite

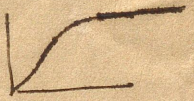
7. Digression on metals
1. Small sp. heat.
2. Large free path.

Wave-aspect.

Piano wire:
air: chamber: Balloon.
Blind eagle

Distribution:

8. Diamagnetism.
Landau



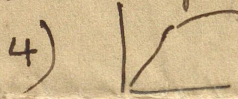
9. Benzene problem.

10 All system verified in graphite

1) Large Δx

~~2) less~~ 2) unidirectional

3) temp. Variation

4)  ~~B~~ β = 1 Bohr magneton

5) $n = 1$.

Fermi Dirac statistics.

+ entropy =

Geol. Inst- lecture

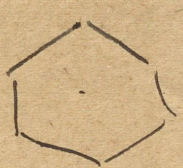
on Graphite

1) { among the elements C unique : millions of compounds Org. chemistry.

Carboniferous age

2) Aliph. + aromatic **

methane



$C_{22}H_{14}$ // $C_{32}H_{18}N_8$

3) modern theory

Intuition of chemist
X-ray structure confirms chemist
Inorganic : through revision

4) Diamond + Graphite
among elements
their crystal structures

(a) size of ring
(b) metallic and
(c) molecular crystal.

esp. of graphite in detail.
(Really an aromatic molec.)
Enormous differences in
properties.

BN. 5)

hardest ✓   Support : lubricant ✓
Transparent ✓   black ✓
insulator ✓   metallic ✓

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6. Metal. 3 difficulties
(1) Small sp. heat
(2) Small para mag.
(3) Large mean free path

Explanation ✗

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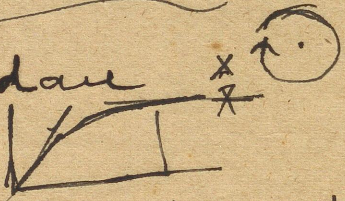
7. Landau ✗



8. Benzene ring: structure

9. All test verified in
Graphite:
(1) Large $\Delta\chi$:
(2) temp. variation :
(3) μ (4) $n = 1$
Intermediate temperatures :

1. metal most suitable. med. Elec. gas.

Interest : discrete energies
High T_0
Even at Abs. Zero.
not much affected by ord. temps.

2. magnetic properties most suitable for study of Ener. distribn.
Graphite most suitable subst.

3. Remarkable properties of graphite
contrast. diamond
lw. black, metallic. — Trans. Refr.
Conductivity — Insulator

Sl. (1) (2) Structures (1) (2)
lubricant Hardness.

4. Presence of free Elec. supported by magnetic data.
one direction same as diamond
other 40 to 50 times greater.

Expt - Graphite (a) setting (b) Rotations up to max. & remove.
(c) Conductivity.

Ex Curve (3) 5. (1) Free Electrons
(2) ~~fr~~ confined to plane / no restriction at all : can not leave layer
(3) Degy ~~temp~~. conductivity is really low. 520° 1/50.
(4) One per atom.

6. Fer. Statis. verification

Benz. profile in those structures

Grap slide again

7. Before discussing significance
aliphatic and aromatic

tetrahedal.
4 valencies.

hexag. 3
various structures.

<u>Diamond</u>

<u>Graphite</u>

8. Soln. of benz. problem.
not located at all :
Sir R. & Coves : Particle : wave

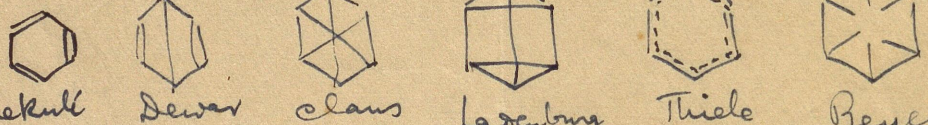
9. Consequences : Optical
1) Abn. polarisation.
(2) Impurity : 'ty polarism.
(3) Fluorescence :

10. magc : Large anisotropy
Table.

11. Conversely where magc. data known
new method of Cryst. analysis.

<u>model.</u> (a) Position of length

$\cos^2\varphi = \frac{\Delta X}{\Delta K}$.



Kekulé Dewar Claus Ladenburg Thiele Beyer