

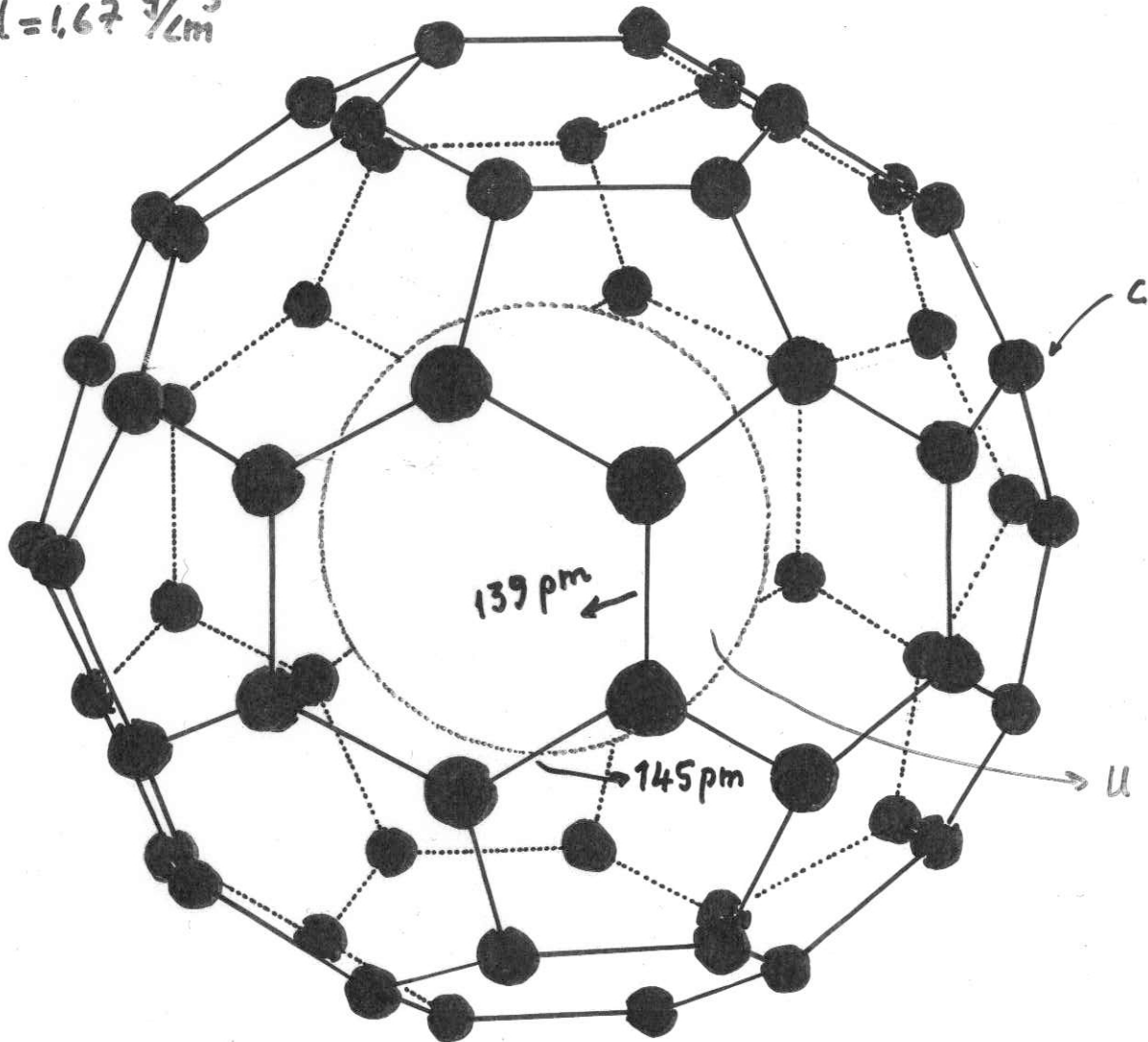
HAROLD D. KROTO, ROBERT F. CURL, RICHARD E. SMALLEY (NOBEL 1996)

Δομή Fullerene (ανά τον Dr. Buckminster Fuller)

C_{60}

60 άτομα - 32 πολύγωνα: 12 πεντάγωνα, 20 εξαγωνα.

$$d = 1.67 \frac{g}{cm^3}$$













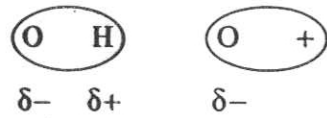
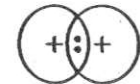
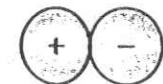
Scientific American
OCTOBER 1991
p. 4, 32

MAY 1990

Max Planck Institute for Nuclear Physics in Heidelberg
Wolfgang Krätschmer
Konstantinos Fostizopoulos





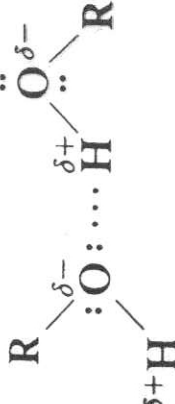



University of Arizona in Tucson
Donald Huffman
Lowell Lamb.

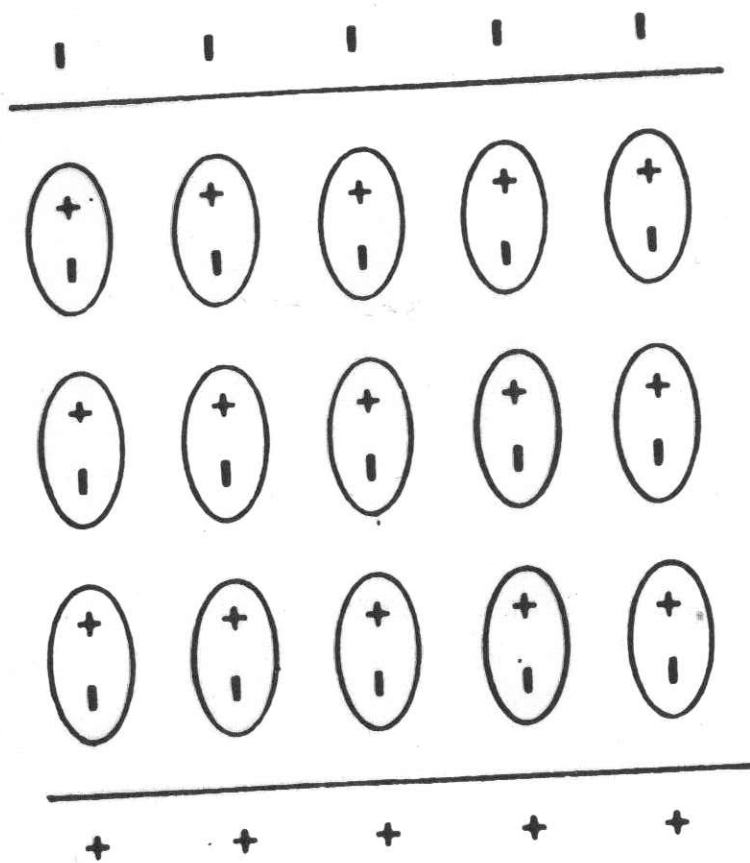
ΤΥΠΟΣ ΑΛΛΗΛΟΕΠΙΔΡΑΣΗΣ	ΚΥΡΙΟΣ ΠΑΡΑΓΩΓΤΗΣ ΥΠΕΥΘΥΝΟΣ ΓΙΑ ΤΗΝ ΑΛΛΗΛ / ΣΗ	ΣΧΕΣΗ ΑΠΟΣΤΑΣΕΩΣ d - ΕΝΕΡΓΕΙΑΣ ΑΛΛΗΛ / ΣΗΣ	ΕΝΕΡΓΕΙΑ ΑΛΛΗΛ / ΣΗΣ kJ/mol .
ΙΟΝ - ΙΟΝ 	Φορτίο Ιόντων	$\frac{1}{d}$	400-6000
ΙΟΝ - ΔΙΠΟΛΟ 	Φορτίο Ιόντος - Διπολική ροπή	$\frac{1}{d^2}$	40-600
ΔΙΠΟΛΟ - ΔΙΠΟΛΟ 	Διπολική Ροπή	$\frac{1}{d^3}$	5-25
ΔΕΣΜΟΣ ΥΑΡΩΘΗΝΟΥ	Διπολική Ροπή	-	10-40
ΔΙΠΟΛΟ - ΕΠΑΓΓΕΙΜΕΝΟ ΔΙΠΟΛΟ 	Διπολική Ροπή - Δυνατότητα διμιομερίας διπόλου.	$\frac{1}{d^6}$	2-10
ΠΑΓΕΜΕΝΟ ΔΙΠΟΛΟ - ΕΠΑΓΓΕΙΜΕΝΟ ΔΙΠΟΛΟ. 	Δυνατότητα διμιομερίας διπόλου.	$\frac{1}{d^6}$	0.05-40

Type of Force	Type of Interaction	Energy of Force (kJ/mol)
London dispersion force (instantaneous-dipole-induced-dipole force)	A temporary dipole induces formation of another dipole to which it is attracted. 	0.05–2
Dipole-induced-dipole force	A permanent dipole induces formation, in a nonpolar molecule, of a temporary dipole to which the permanent dipole is attracted. 	0.05–2
Ion-induced-dipole force	An ion induces formation, in a nonpolar molecule, of a temporary dipole to which the ion is attracted. 	1–3
Dipole-dipole force	Polar molecules attract one another. 	1–5
Ion-dipole force	An ion is attracted to a polar molecule. 	10–20
Hydrogen bond	Two dipoles, one of them containing hydrogen bonded to an electronegative element and the other containing an electronegative element, attract one another. 	20–40
Covalent bond	Nuclei of two atoms attract electrons shared between them. 	200–400
Ionic bond	Cations and anions attract one another. 	300–600

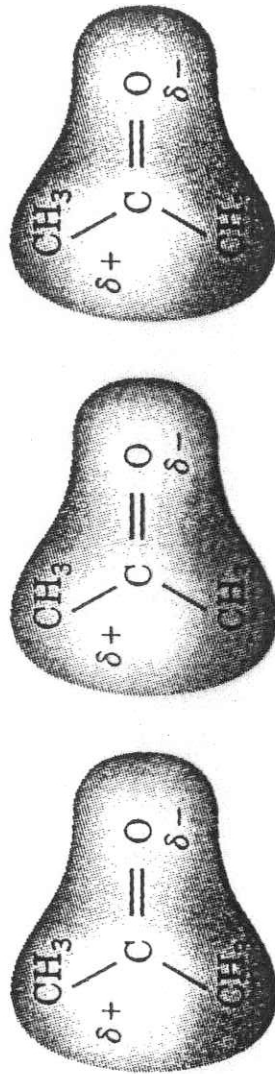
Intermolecular and Bonding Forces.

Attractive electric forces

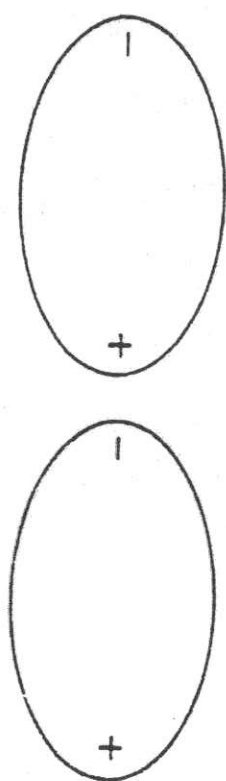
ELECTRIC FORCE	RELATIVE STRENGTH	TYPE	EXAMPLE
Cation-anion (in a crystal)	Very strong	⊕ ⊖	Lithium fluoride crystal lattice
Covalent bonds	Strong (36-125 kcal mol ⁻¹)	Shared electron pairs	H—H (104 kcal mol ⁻¹) CH ₃ —CH ₃ (88 kcal mol ⁻¹) I—I (36 kcal mol ⁻¹)
Ion-dipole	Moderate	 	Na ⁺ in water (see Fig. 2.18)
Dipole-dipole (including hydrogen bonds)	Moderate to weak (1-9 kcal mol ⁻¹)	 	
van der Waals	Variable	 and  and 	Interactions between methane molecules

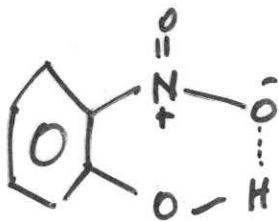
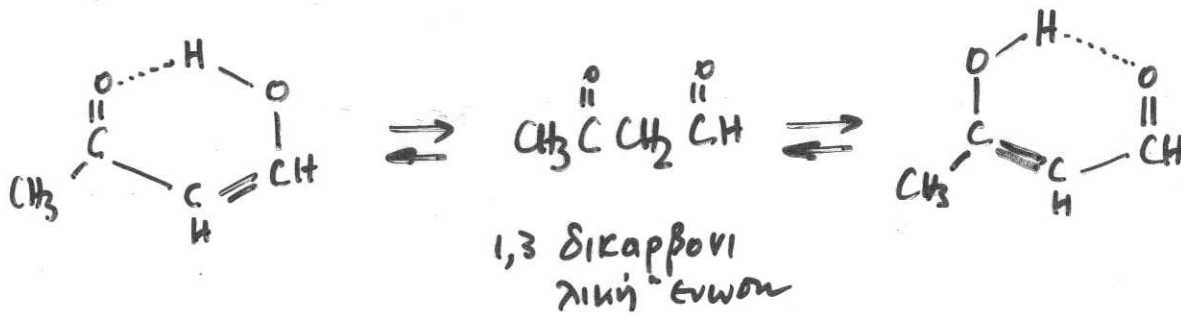
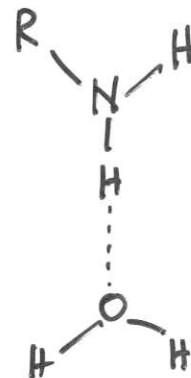
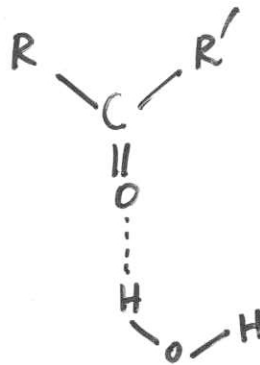
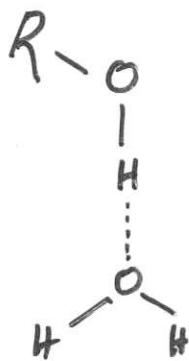


Σχηματική παράσταση προσανατολισμού διπόλων σε ηλεκτρικό πεδίο. Ο προσανατολισμός μέσα σε ηλεκτρικό πεδίο ουδέποτε είναι τόσο τακτικός. Η τάξη τείνει να καταστραφεί από τη θερμική κίνηση.



Dipole-dipole interactions between acetone molecules.





ο-νιτροφαινόλη..

