the zen of chemistry

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Intermolecular Bonding

Presented by
Amelia McCutcheon

Intramolecular & intermolecular forces

Intra = within

Intramolecular: within one atom/molecule/ compound

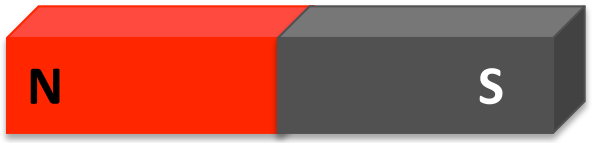
Inter = between

Intermolecular: between multiple atom/ molecule/ compound

Dipole-dipole forces

- Di = two
- Polar = opposites

Think Magnets!



Dipole-dipole forces

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Think Magnets!

Dipole-dipole forces

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Think Magnets!

Dipole-dipole forces

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Think Magnets!

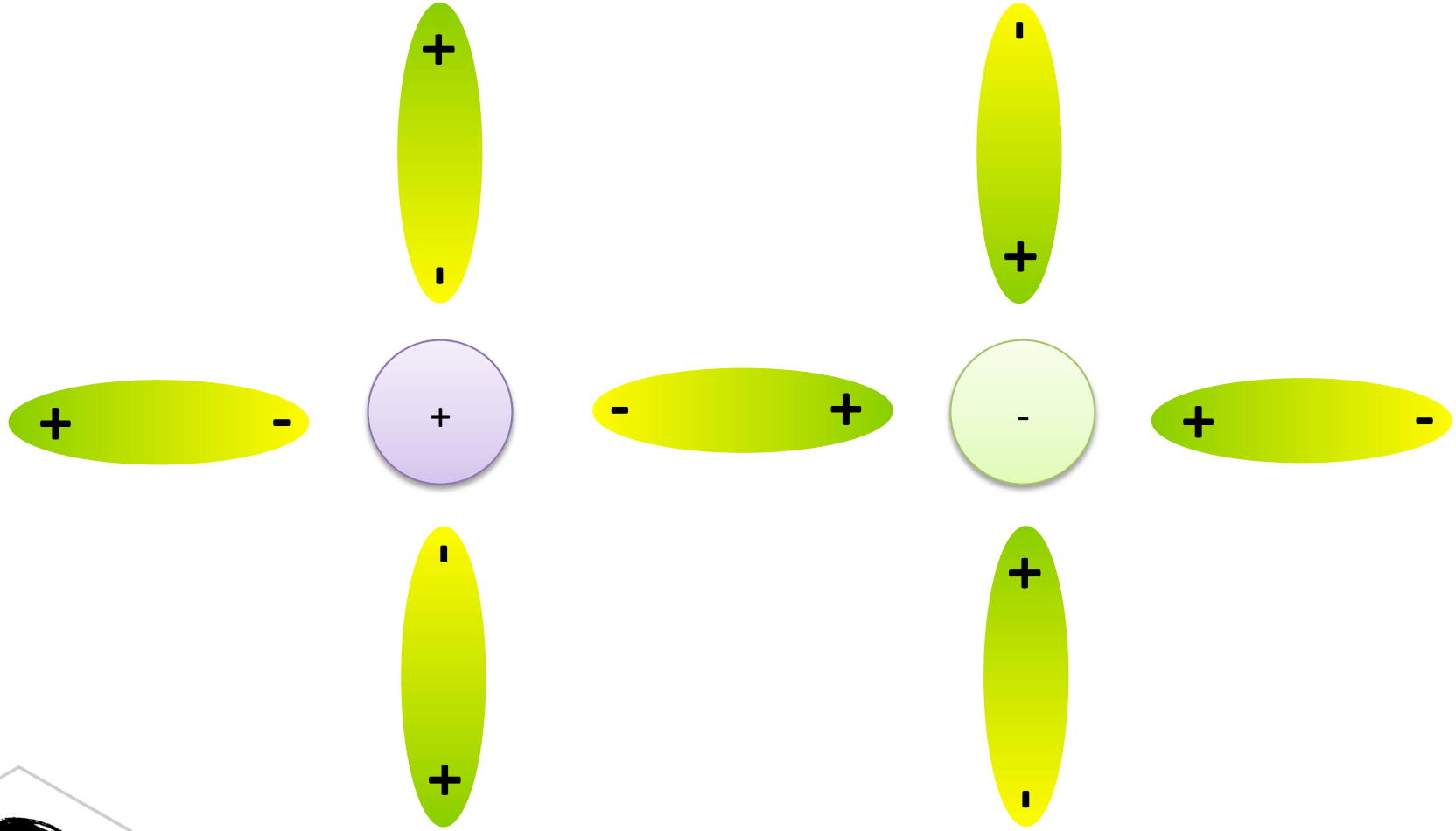
Dipole-dipole forces

- In the context of molecules, we are talking about positive and negative ends of a POLAR molecule
- Electronegativity and asymmetry within a molecule causes a **permanent** dipole

Ion-dipole Forces

- Dipole in molecular compound is attracted to cations and anions in solution
- Negative (-) end of dipole is attracted to cations
- Positive (+) end of dipole is attracted to anions

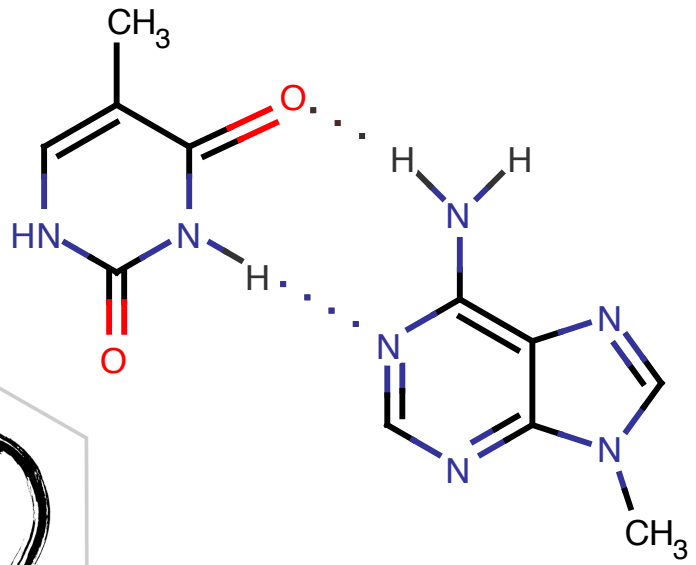
Ion-dipole Forces



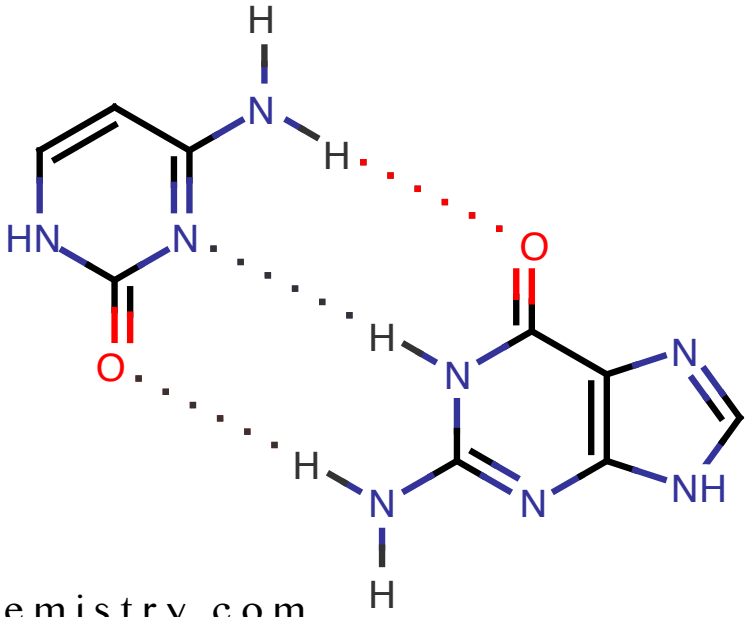
Hydrogen Bonding

- Strongest type of intermolecular bonding
- H bonded to N, O or F

T=A



C≡G

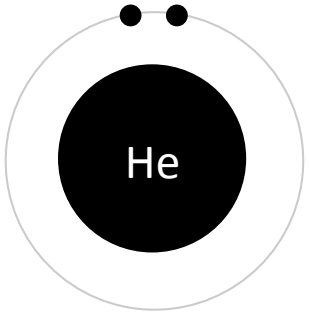


Dispersion Forces

- Also named van der Waals forces
- Weakest of the intermolecular forces
- Based on the idea that all atoms, ions, molecules and compounds have an **instantaneous dipole**
- In **ALL** atoms, ions, molecules and compounds

Dispersion Forces

- e.g. Helium atom



Dispersion Forces

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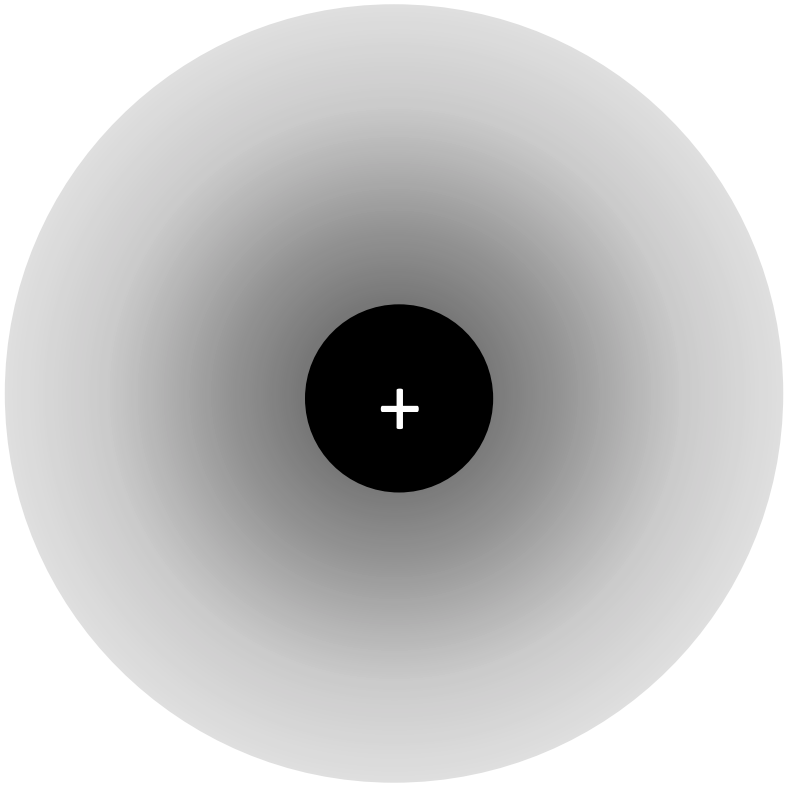

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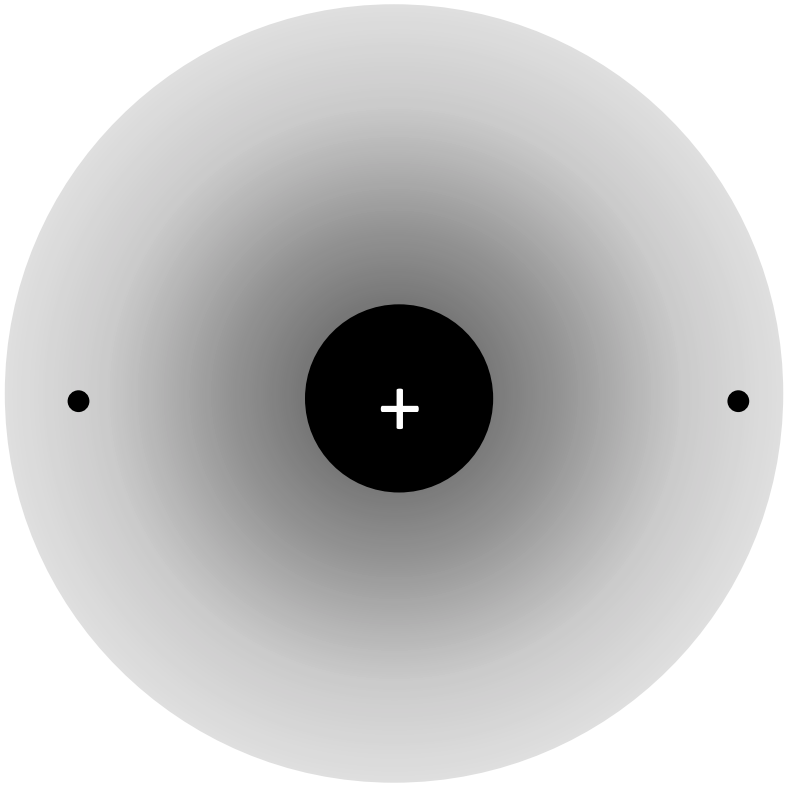

Dispersion Forces

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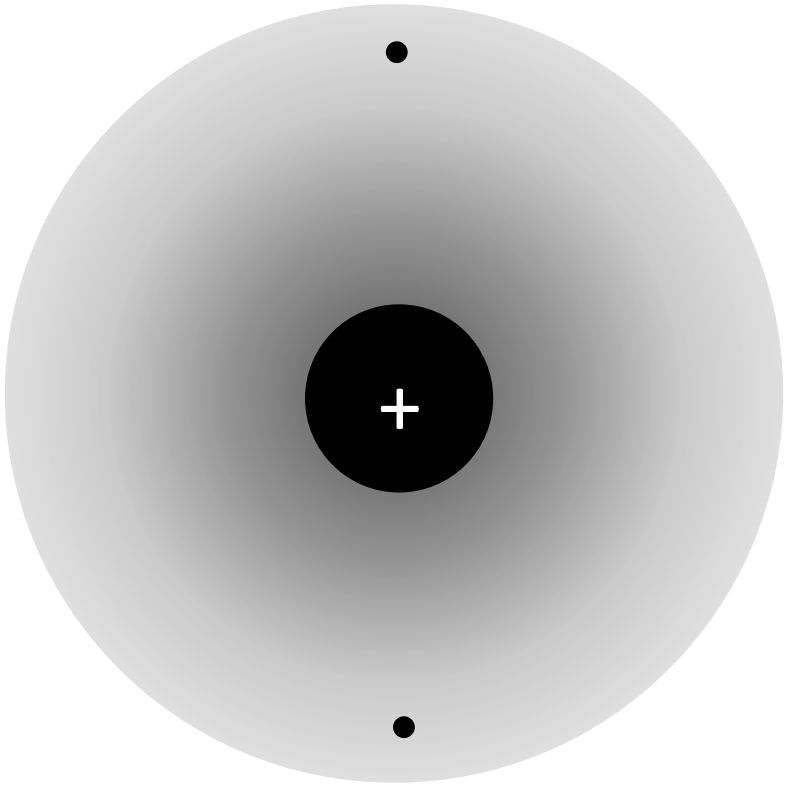

Dispersion Forces

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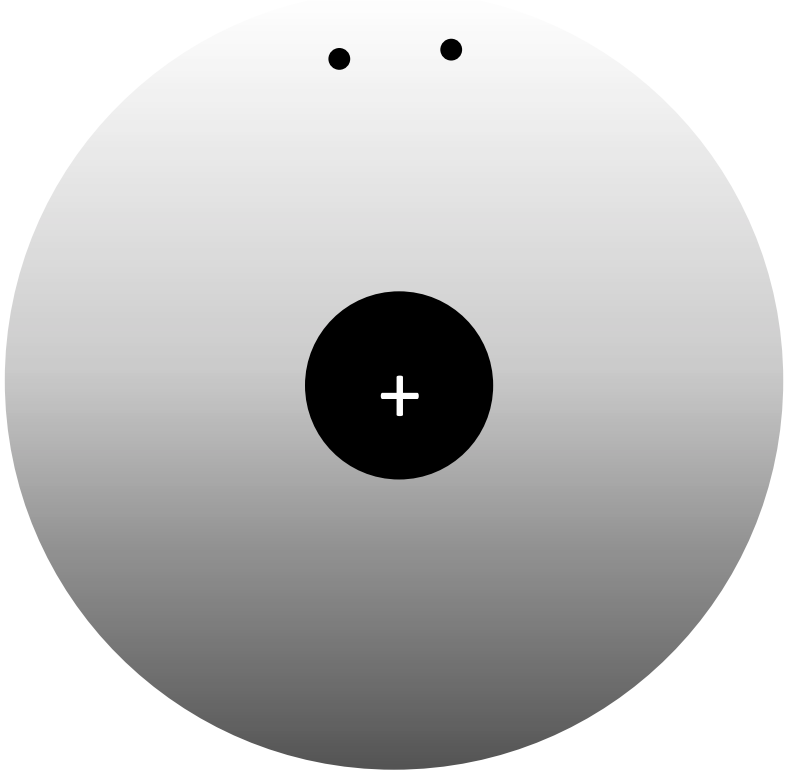

Dispersion Forces

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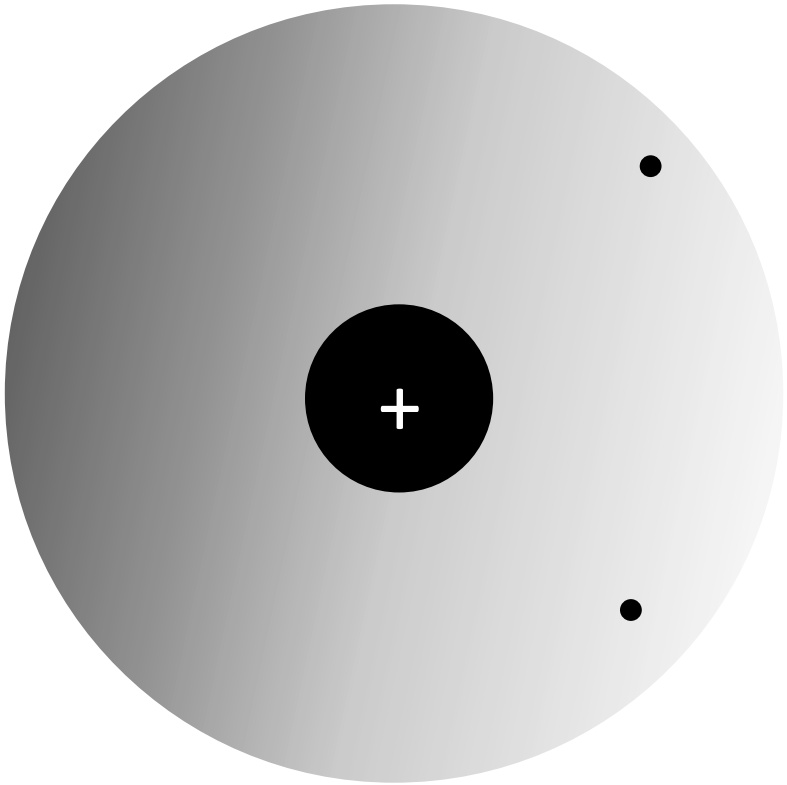

Dispersion Forces

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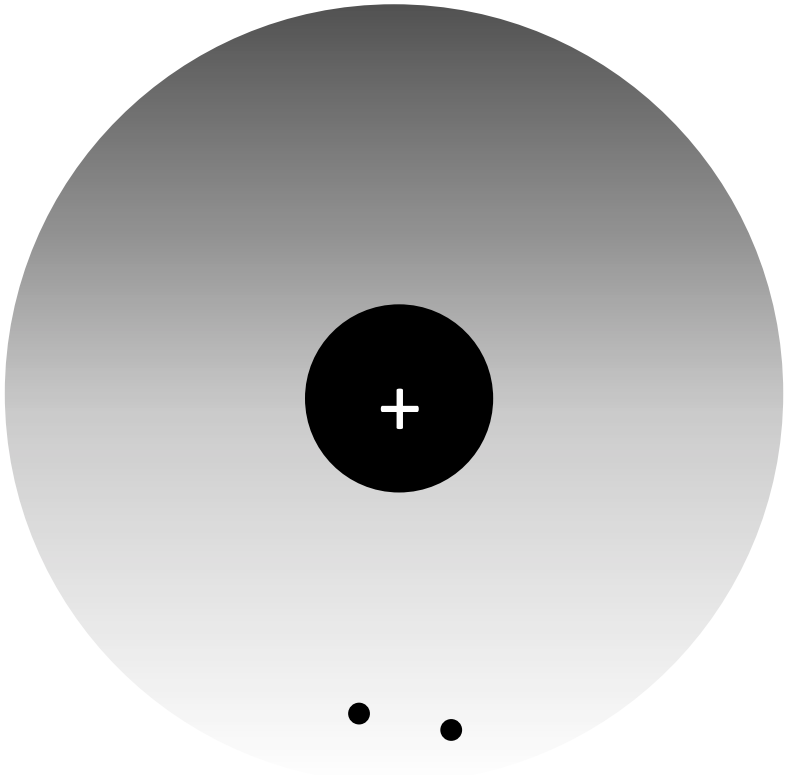

Dispersion Forces

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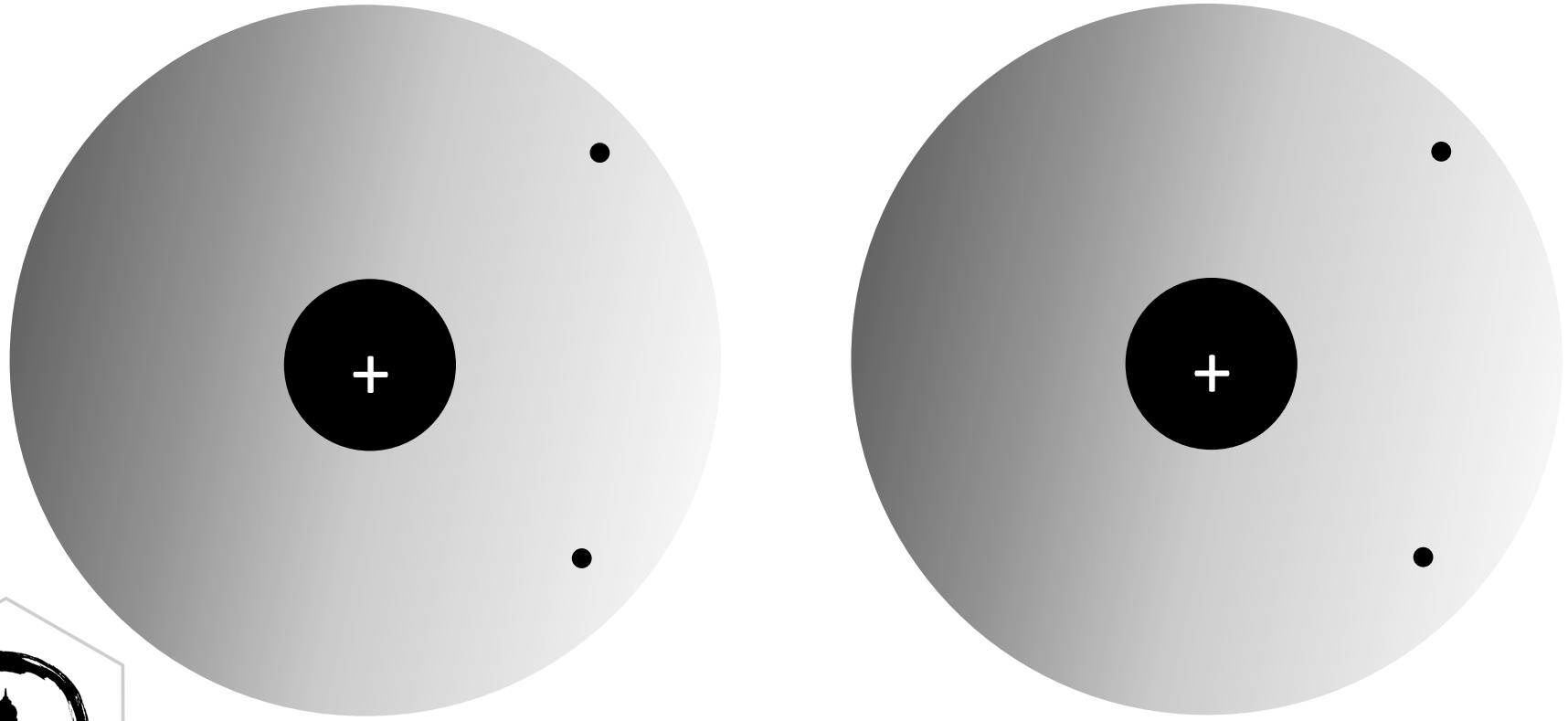

Dispersion Forces

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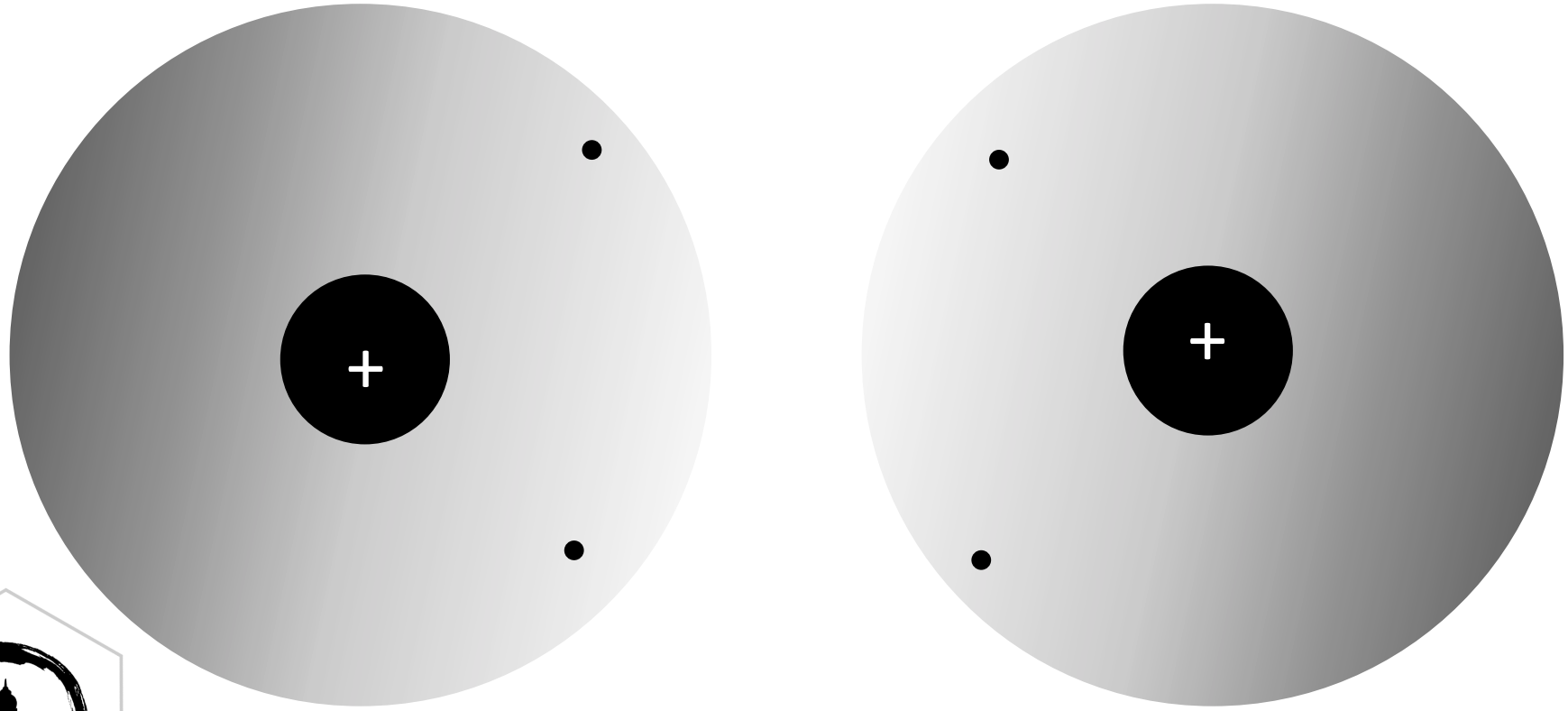


Intermolecular forces

Dipole-dipole Forces

- Electronegativity and asymmetry within a molecule causes a permanent dipole
- Positive (+) end of one molecule is electrostatically attracted to the negative (–) end of another

Ion-Dipole Forces

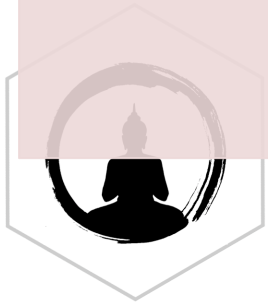
- Dipole in molecular compound is attracted to cations and anions in solution
- Negative (-) end of dipole is attracted to cations
- Positive (+) end of dipole is attracted to anions

Hydrogen bonding

- Interaction specifically between H and N, O or F (denoted by - - - - - -)
- Electronegative part of molecule containing N, O or F creates a hydrogen “bond” with a hydrogen in another molecule nearby
- Strongest of all intermolecular forces

Dispersion forces

- also known as van der Waals forces
- Instantaneous dipole
- Weakest of all intermolecular forces but present in all atoms, molecules and compounds



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