Ideal Gas Law

METROPOLITAN Community College

INTRODUCTION

- Ideal Gas Law states that PV=NRT
- P=Pressure(Pascals)
- V=Volume(Liters)
- N=Amount of Gas(Moles)
- R=Molar Mass(g/mol)
- T=Absolute Temperature of Gas(Kelvin)
- Will Balloons filled with different gases pop at different altitudes?

REFERENCES

Young, Hugh D. Freedman, Roger A. Ford, A Lewis. 2018. *Sears and Zemansky's University Physics with Modern Physics 14th edition*. India, Pearson India Education Services.

METHOD

Fill several balloons with various gases to a known pressure & volume

P=107991 Pascals

V=14.83 Liters

Attach balloons to lifting balloon and film to determine burst altitude

Gases to be used are Oxygen, Air, Nitrogen, & Argon

Oxygen will contain greatest N, Argon the least

Nitrogen in Green Balloon

Argon in Orange Balloon

Will the heavier gases burst first?

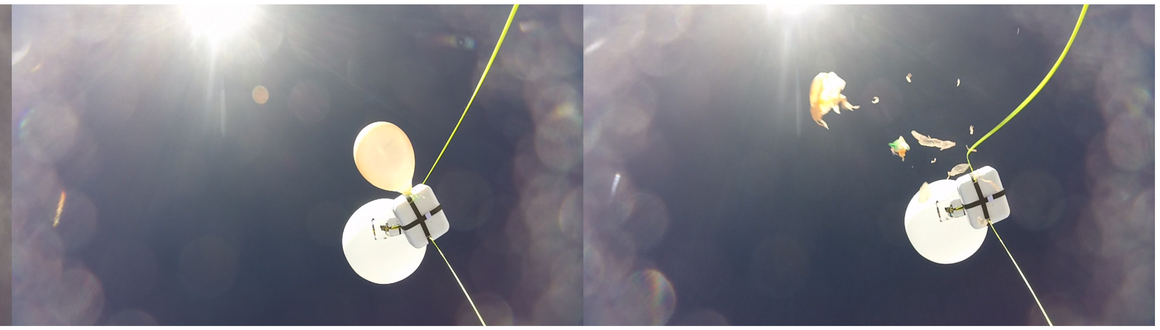
CONCLUSIONS

- Sadly, Oxygen and Air balloons detached from lifting balloon before burst
- Argon burst at 2.67 times greater altitude
- Argon weighs 2.85 times more g/mol
- As altitude increases, outside pressure decreases
- Volume inside balloon expands until the surface area of balloon reaches maximum
- At this point the balloon's internal pressure increases until it bursts (Approximately: 111991 Pascals)
- It appears that the greater number of Nitrogen molecules caused this change to happen faster than Argon
- Burst altitude corresponds to relative g/mol

NITROGEN

- **Nitrogen 14.0067 g/mol**
- **Initial fill contained 387,313 moles of Nitrogen**
- **Nitrogen burst at an altitude of 4903.7 Meters**

ARGON



- **Argon 39.948 g/mol**
- **Initial fill contained 135,897 moles of Argon**
- **Argon Burst at an altitude of 13091.6 Meters**

CONTACT

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