NASA AT 50
1998: Work Begins to Preserve Charters of Freedom
Teacher's Guide

Grade Level: 6–12 **Curriculum Focus:** Science, Social Studies **Running Time:** 6 minutes

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Introduction

NASA at 50 acquaints students with key innovations and milestones in chemistry, physics, engineering, and space exploration from NASA's fifty-year history. Each clip serves as a gateway for extended lessons in science and history, promoting critical thinking and inquiry as essential components of scientific literacy.

Program Description

Details how NASA assisted the National Archives in preserving the original copies of the Charters of Freedom, or the Constitution, the Declaration of Independence, and the Bill of Rights. The program explains that although the documents were placed in helium-filled encasements in 1951, strange white spots appeared on the documents in the mid-1990s. By conducting a series of tests on the atmosphere inside the encasements, NASA was able to determine the source of the problem and prevent further deterioration from occurring.

Learning Objectives

After viewing the program and participating in discussion, students will be able to:

- Explain why National Archives called upon NASA for help;
- Describe the findings from the series of tests NASA conducted;
- Identify how the Charters of Freedom are now stored.

Classroom Connections

Why did the National Archives ask NASA to help them determine why the Charters of Freedom were developing white spots?

What did NASA discover about the atmosphere inside the encasements?

Why did the National Archives originally use helium to fill the encasements? Why did NASA reseal them with argon?

What was the reason for the water vapor inside the encasements?

Classroom Activities

After NASA found the source of the white spots on the Charters of Freedom, they refilled their encasements with argon. Originally, the encasements were sealed with helium. What was the reasoning for using argon versus helium? Students should analyze the differences in composition in argon and helium. Students may want to use the interactive Table of Periodic Elements (http://www.chemicalelements.com/). What are some uses of helium and argon?

Target Vocabulary*

alkali metal - any of the monovalent mostly basic metals of group I of the periodic table comprising lithium, sodium, potassium, rubidium, cesium, and francium

brittle - easily broken, cracked, or snapped

corrode - to eat away by degrees as if by gnawing; especially: to wear away gradually usually by chemical action

deteriorate - to become impaired in quality, functioning, or condition

water vapor - water in a vaporous form especially when below boiling temperature and diffused (as in the atmosphere)

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Academic Standards

National Science Teachers Association
The National Science Teachers Association (NSTA) has developed national standards to provide guidelines for teaching science. To view the standards online, go to http://www.nsta.org/publications/nses.aspx .

This guide addresses the following standards:

- Science and Technology
- Earth and Space Science
- People, Places, and Environments
- Science in Personal and Social Perspectives
- History and Nature of Science

National Council for the Social Studies

The National Council for the Social Studies (NCSS) has developed national standards to provide guidelines for teaching social studies. To view the standards online, go to http://www.socialstudies.org/standards/strands/.

This guide addresses the following standards:

- Time, Continuity, and Change
- People, Places, and Environments
- Science, Technology, and Society
- Individuals, Groups, and Institutions