CHEMISTRY

Caution Rocketry Amateurs

Building and firing rockets can be a dangerous hobby. Experts give young rocket enthusiasts a list of do's and do not's to follow and also recommend studying rocket theory.

➤ YOUNGSTERS who feel the urge to build and fire rockets should stick to tested materials available in hobby shops and leave gas pipes and explosive chemicals alone, professional rocket scientists warn.

Rocket engineers and chemists who responded to a SCIENCE SERVICE survey agree their best advice for the youngster is to forget about home-made rockets until they have learned all they can from less spectacular, but safer, projects.

However, the professionals offer these safety precautions:

Obtain close supervision from a competent person. Just because a person is a scientist, the rocket experts say, there is no assurance he is thoroughly familiar with explosives, gas expansion and properties of rocket materials.

Plan each project carefully well in advance of the firing date. Such planning enables experimenters to foresee and overcome difficulties. Also, by knowing the detailed needs of the project, youngsters will have plenty of time to locate safe materials and will not have to make hasty substitutions of unsafe material.

Do not use stove, water or gas pipe for rocket casings. Some of this pipe is designed to hold up under steady pressure, but will burst under sudden pressure or heat. Nearly all pipe commonly available is made with a seam, sometimes hidden, that splits under explosive force. Seamless pipe, which is usually more expensive and harder to locate, must be used.

Distinguish between explosives and rapid-burning fuels. Gunpowder is an explosive. Solid propellants in military rockets are rapid-burning fuels, even though to the casual observer they apear to act explosively. Remember that nearly all rapid-burning fuels are explosives under certain conditions. Learn the conditions. Mixtures of potassium chlorate or potassium nitrate and sugar, powdered zinc and sulfur, powdered aluminum or magnesium and oxidizing agents are always dangerous explosives when ignited in confining containers.

Always fire even "safe" rockets by remote control from behind barricades. All persons in the area must be sheltered. Even a "safe" rocket carrying a light load in a strong container can tip or be pushed by a breeze at the last minute to fire in the wrong direction.

Find a safe range. Even if the rocket fires safely, without exploding, it must come down somewhere. Make sure the range is long enough to accomodate the rocket on its most successful flight, and wide enough to permit deviations from the course caused by breezes or even the smallest warps in fin surfaces.

Make sure local laws permit rocket firing. Some rocketry experts believe legal authorities have every right to call amateur rockets fireworks and ban their use wherever fireworks are banned.

Do not use actual rockets for clubroom or classroom demonstration of rocketry principles. Use balloons or carbon dioxide bottles. In this connection, do not try to improvise from "empty" aerosol cans such as are used for shaving lather, house sprays or whipped cream.

Avoid the use of home-made rockets in projects wherever possible. For example, in testing the flight characteristics of a new fin design, use a small hobby-shop rocket—there will be one less chance of an accident.

Plan projects scientifically to gain scientific knowledge. Such a procedure often shows that the building and firing of a rocket can be eliminated, but the information still gained through safer means.

Rocket Theory Emphasized

Rocketry, including amateur efforts, has become so advanced that student enthusiasm must be directed away from mixing fuels and firing rockets and channeled into the more important study of theory, say Cmdr. Robert C. Truax, president of the American Rocket Society, and Donald W. Patterson, director of the Office of Guided Missiles Activities of the Assistant Secretary of Defense for Research and Engineering.

Cmdr. Truax, Ballistics Missiles Division, Air Research and Development Command, Inglewood, Calif., recently analyzed and suggested a safe, but powerful steam-powered rocket that eliminates mixing and transporting explosive fuels. He told SCIENCE SERVICE the amateur rocket, which should reach altitudes of five to ten miles, resulted from a desire to protect his 15-year-old daughter and her young friends who are rocket enthusiasts.

The rocket would consist of a metal shell similar to those used for explosive-filled rockets, but contain water and an empty space in which steam builds up to supply pressure for thrust. The shell is fitted with a nozzle and plug, stopcock or automatically popping safety valve set for high steam pressure. It would be launched from a ramp containing a heater to convert the water to steam.

Mr. Patterson, whose office maintains a technical review of most military guided missiles, told SCIENCE SERVICE: "It is inconceivable, in view of the top talent and almost unlimted facilities available to our rocket and missile program, that an amateur effort would result in any worthwhile design or fuel formulation not already considered officially, but I think student and amateur efforts must continue and their support is justified on the basis of training future scientists."

However, Mr. Patterson said, for this training to be worthwhile it must be in science fundamentals and basic rocketry techniques, and should not be allowed to "degenerate into fireworks displays." The principle of rocket reaction, he said, can be demonstrated by releasing air from a balloon.

The question of where student and

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amateur rocketry groups can fire their home-made rockets has been answered by spokesmen for the Armed Services.

All three military branches are encouraging well-supervised rocketry groups at local levels and such groups will be welcome at many military installations. However, there are some strings attached.

Groups requesting permission to launch rockets from military bases must be well-organized under the close supervision of competent persons, and must demonstrate a bonafide interest and knowledge in the fields of science that comprise rocketry.

Amateur groups merely wanting to "put something in the air" or conduct "fireworks displays" can expect to be denied permission to use military facilities by local base commanders upon whose authority the decisions rest.

Amateurs Use Military Bases

Students and amateurs must not expect the use of military tracking facilities and personnel. About all a local commander can offer is safe space and any barricades that might exist, such as those found on a rifle firing range. However, space and barricades are the two most elusive items on a rocket club's "must" list.

In all three services the decision to deny or admit rocketry groups to military bases must be made by the base commander. None of the services has an overall policy on the matter, but each is committed to maximum cooperation with local civilian groups without changing the nature of the post.

The Army comes closest to a formal general policy in its Army Regulation 360-55, which authorizes commanding officers to develop and promote ways in which members of their commands can participate in local civilian activities.

By direction of Congress, the Army cooperates, even to the point of some financial subsidy, with such groups as the Boy Scouts, Civil Air Patrol and National Rifle Association. So far there is no Congressional directive covering rocketry groups, but Pentagon spokesmen feel the spirit of the law is sufficient authorization to cooperate without financial aid.

Army spokesmen said well-supervised rocket clubs conducting planned programs for scientific knowledge already have been allowed to fire from many posts. Even the security-conscious White Sands, N. M., installation has welcomed amateur groups during free time from military projects and after ample notice to security officers.

Air Force and Navy commanding officers operate under general policies of "cooperation with the public," but at present do not have any clear-cut directives concerning rocket clubs. However, spokesmen for both services said that qualified rocket clubs should have no difficulty in obtaining permission to use any facilities that might be available.

The Air Force makes it clear that amateur rocket groups should not expect to use the guided missile test facilities at Cape Canaveral, Fla.

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PUBLIC HEALTH

Flu Danger Still Present

➤ THE NATION still faces the danger of more influenza.

Experts agree that things look quiet now but they have their own opinions about the chances of another wave of the illness sweeping the United States. Some say probably yes; some say probably no. All admit that they can only speculate about it.

In the Far East, a second epidemic due to Asian flu apears to have reached its peak in most areas. The spots that were missed during the first wave last May and June are the ones being hardest hit this time. The same thing could happen here. There is no indication, however, that it will at the present time.

Vaccination with the new 400 CCA vaccine (CCA stands for chicken cell agglutination unit and is a measure of the vaccine's potency) is still strongly recommended by the U. S. Public Health Service. This is especially true for high risk groups such as elderly people with heart and lung diseases.

If you have already had the Asian flu your worries are over since only a very few cases have been reported where one person suffered the illness twice. Generally it leaves the individual with a higher degree of protection than he can get from any vaccine.

All the vaccine now being produced and used is the new 400 CCA type. This has twice the strength of the earlier 200 CCA vaccine and has been required from all the manufacturers since Dec. 1, 1957.

The new 400 CCA vaccine is reported to be 80% to 85% effective while the older 200 CCA type was thought to be 60% to 70% effective.

At the time the vaccine was first manufactured, the pharmaceutical companies were unable to get the virus to grow as fast as they wanted. The 200 CCA vaccine was the best they could get then, so it was put on the market to supply the mushrooming demand.

As time went on, the virus began to grow much better and a 400 CCA vaccine became practical. This has now been adopted as the standard potency.

Vaccine manufacturers are slowing down production somewhat since the available supplies are expected to be able to meet present needs.

From a financial standpoint, the manufacturers are much safer with excess flu vaccine than they were with the unused polio vaccine. Two big reasons are the dating on the products and the difference in production time and cost.

The flu vaccine is good for 18 months so it can be kept on hand for use again next year. Polio vaccine on the other hand has to be destroyed after six months.

In addition, the flu vaccine can be made in about 50 days, whereas the polio vaccine requires seven months. On the whole, the companies are not anticipating the need to destroy much of their flu vaccine.

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ASTRONOMY

1958 Big Satellite Year

➤ NEW LAUNCHINGS of man-made earth satellites, both by Russia and United States, three eclipses and a relatively "close" approach of Mars highlight the astronomical events for 1958.

Landing a rocket on the moon, within present capabilities of both U. S. and Russia, is also a possibility.

Although some astronomical events can be predicted, others happen unexpectedly, so 1958 may see the appearance of one or more naked eye comets, just as 1957 had three.

Because of the total eclipse of the sun, occurring on Oct. 12, the day was selected by International Geophysical Year authorities as a day on which many extra observations of all kinds will be made. It is also the day of a new moon, and one on which the extra "shooting stars," or meteors, of the Orionid shower should start to appear.

Although there may still be snow on the ground in many parts of the country, spring will arrive March 20 at 10:06 a.m. EST, astronomers at the U. S. Naval Observatory here have calculated. Official beginnings of the other seasons are summer, 4:57 p.m. EST on June 21; autumn, 8:10 a.m. EST on Sept. 23; and winter, 3:40 a.m., EST on Dec. 22.

During 1958 a special program of visual meteor observation is being conducted in connection with the International Geophysical Year. Instruction and report forms are available from the IGY Meteor Center, National Research Council, Ottawa, Canada.

Ten other meteor showers with observing rates from 12 to 40 an hour are scheduled for 1958, including the Aurigids on Feb. 10 with 12 an hour and the Ursids on Dec. 22.

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● RADIO

Saturday, Jan. 18, 1958 1:30-1:45 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. James A. Reyniers, research professor of bacteriology, University of Notre Dame, Notre Dame, Ind., will discuss "The Need for Technicians."

A self-generating, dynamic *accelerometer,* capable of handling accelerations to 1000 g's, is now available.