atmosphere can be produced containing about 13% CO_2 and less than 1% oxygen. Some sorption of CO_2 occurs in the grain but the generated gas, like pure CO_2 replaces interstitial air with a single change of the atmosphere. The level of CO_2 in the gas is also of importance in synergising the effect of the low oxygen level against insect pests.

In conclusion it was noted that in many situations the use of an on-site generated atmosphere offered the cheapest method of using controlled atmospheres for insect control. Carbon dioxide at about 60-80% in air, was the atmosphere most effective against pests but needed a supply system for practical use. It did have potential in parts of the world where dense population was accompanied by industrial development. The current downward trend in prices for molecular seives improved the prospects for the use of nitrogen and the development of membrane filter based extractors in the future offered a new dimension to controlled atmosphere storage.

ROUNDTABLE VI. AERATION AND COOLING FOR IMPROVING GRAIN STORABILITY
Discussion moderator: M.R. Sartori, Brazil.

Topics discussed during the roundtable were:

In humid and hot climates where there are slight fluctuations of temperature between day and night, the roundtable participants were in agreement that aeration as a general rule, should not be recommended for bulk stored grain. Under these conditions it is extremely important that dried grain received for storage should be protected against moisture reabsorbtion and excessive heating. Silos should be shaded or have walls and roof with sufficient insulating power to protect the product against excessive heat. If drying facilities are not available humid products should be stored in loose stacks in warehouses with good air circulation. The air circulation in those warehouses could be improved by the construction of wind catching devices in the roof in order to take maximum advantage of prevailing day and night winds.

Another possible emergency situation for stacks of humid grain would be to have a polyethylene sheet wrapped tightly around the stack leaving the bottom uncovered. A fan connected to the top of the stack would suck the air through the stack and blow it to the outside.

Aeration of bulk stored dry grain, when the R.H. of the air is high, as a general rule would be possible if there is at least 6°C difference between the ambient air and the grain temperature. However, after the grain has been cooled, moistening may occur if humid and warm air is moved through the grain bulk.

Aeration was defined as the movement of air through the grain bulk to preserve the grain quality and improve storage conditions by preventing moisture migration and lowering the grain temperature.

Aeration with chilled air would reduce the temperature of the grain to the range of 10-15°C. The energy consumption would be 3 to 5 kwh/ton for one pass during the summer. Cooling of the grain should be done as soon as possible after harvesting. Temperatures below 17°C would slow down considerably the development and prevent damage by most of the stored product insects.

In temperate climates the use of refrigerated air for the preservation of slightly moist barley was shown to be effective. However in humid tropical and subtropical climates this method needs to be investigated.

Another aspect discussed was the reverse cycle moisture migration, in which moistening of grain pockets are observed at the bottom of the bins with cold grain during summer. Experimental data to evaluate the extent of this problem is not available.

In conclusion, aeration is simply the process of using air as the transport medium for moisture and heat. The psychrometric principles are simple and easily understood. The problem lies in engineering difficulties involved in applying of this principle to the solution of particular problems.

ROUNDTABLE VII. PROSPECTS FOR THE USE OF IONIZING AND MICROWAVE RADIATION FOR INSECT CONTROL

Discussion moderator: F.M. Wiendl, Brazil.

Topics discussed were:

1. The labeling of irradiated food items (pros and cons).
2. Problems of shortening irradiation exposure times.
3. The use of pre iradiation and post irradiation heat treatments to increase effectiveness.
4. Advantages of gamma irradiation in treatment of packed food: the possibility of irradiating food within the package.
5. Simplicity of gamma irradiation technique.
6. Minimal maintenance costs over initial 10 year period.
7. Advantage of clean handling of food.
8. Advantage that treated food is free from toxic residues.
9. Extremely suitable for developing countries such as Brazil which do not have sophisticated disinfestation equipment installed.
10. The use of irradiation for exported commodities.
11. Multiple use of irradiation (but through another line)
12. Uniformity in quality of irradiated foods,- a requirement necessary to achieve optimal results.
13. The ready availability of Cobalt 60.
14. The need for legislation in some countries.
15. The problem of high initial cost.
16. The problem of resistance by nature conservation movements (Greenpeace) to irradiation.
17. The experience by Japan with irradiation of potatoes and other items.
18. The experience of South Africa on irradiation, mainly with fruits.
19. The experience of Holland on irradiation of diverse items of food.
20. A project: The combination of irradiation with PH3 for contolling adult insects.