5 Scientists, 5 Different Companies, 5 Different Methods, Same Conclusion for Tire Inflation Using Nitrogen Gas

1. Effects of Nitrogen Inflation on Tire Aging and Performance (May 17, 2004)
By John M. Baldwin, David R. Bauer, Kevin R. Ellwood, Ford Motor Company Dearborn, MI

"The overall conclusion of the study is: When N2 is used as the inflation media, the change in rubber properties is significantly slowed down or even halted. From a practical standpoint it is important to note that the presence of 1 atmosphere of air in the 96% nitrogen inflated tires did not significantly affect the results, as compared to the 99.9% nitrogen inflated tire. This is important for the average consumer because the need to purge existing tires completely of air before filling with nitrogen may not be necessary. Another conclusion is that the oxidation of the steel belt rubber is truly driven from the contained air pressure inside a normal passenger or light truck tire. The skim region may be oxidized slightly from outside the tire when filled nitrogen, but the rate of degradation is significantly lower than when the tire is filled with air. The wedge rubber, on the other hand, is in a sufficiently thick part of the tire, and is not nearly as susceptible to oxidation from the outside. The converse of this conclusion, therefore, is that oxidative aging can be accelerated by the use of oxygen enriched filling gases in the tire cavity without changing the mechanism of degradation in the tires internal components."

2. Nitrogen Inflation for Truck Tires (Presented at the Clemson Tire Conference 2004)
By Guy Walenga, Bridgestone/Firestone

Pressure Loss: It is clear that Nitrogen Inflation retains inflation pressure in truck tires better than Air Inflation. **Oxidation of Tire Components:** Nitrogen Inflation does reduce the oxidation degradation of rubber components in Truck Tires. **Compound Physical Properties:** It is clear that Nitrogen Inflation does reduce the loss of compound physical properties in truck tires compared to air inflation. This reduction in physical property loss does result in better-retained drum life for used tires. **Eliminating Water Vapor:** The fact that Nitrogen Inflation provides dry inflation is a major advantage for long-term tire performance

3. Million Mile Truck Tires – Available Today (Jan 9, 1985)
By Lawrence R. Sperberg, Probe Scientific Laboratory, El Paso, Tx

"The perennial problem of low tire inflation can be effectively solved by the simple expedient of using nitrogen to inflate tires. Nitrogen is dry and contains no moisture. Nitrogen is inert so rust cannot form since there is neither oxygen nor moisture present to cause oxidation of the wheel.

Nitrogen inflation has the potential of doubling, trebling, and even quadrupling the miles that a tire can run through all its several lives made possible by retreading. Since a large number of truck tires already run a quarter million miles before being discarded, with some running even a half million miles, nitrogen inflation can open the door to an era of commonplace million mile truck tires, where the tires could conceivably outlive the new truck upon which they come to the customer."

4. Long Term Durability of Tires (The International Rubber Conference, Kyoto Japan, October 1985)
N. Tokita, W. D. Sigworth, G. H. Nybakken, G. B. Ouyang, Uniroyal Inc. Research Centre.

"An accelerated diffusion-oxidation test for tires was developed. Table 1 shows the tear strength of breaker stock excised from tires for unaged, accelerated aged and accelerated aged with pure Nitrogen. The oxygen-aged tires showed rubber deterioration, whereas the tire filed by N2 showed very little".

5. Factors in Tubeless Radial Tires (Rubber and Plastics News 1993 Technical Yearbook)
David M. Coddington, Exxon Chemical Co.

"A study by N. Tokita et al. (paper quoted above) has demonstrated that oxidative degradation is, indeed, a significant factor in belt edge separation of radial tires. 20 cycles [of a laboratory wheel test] were said to correspond to approximately 36,500 miles over two years on the road. Table III shows the tear strength of breaker stock samples excised from the test tires after the above oxidative conditioning and comparison non-O2 conditions. **The oxygen-aged tires showed major reduction of strength (to 38% of new strength) while those inflated with nitrogen showed slight loss (over 80% of original strength).**

[Another] study demonstrated that radial tire durability in normal road service is significantly influenced by intracarcass pressure and oxygen degradation as well as by belt edge strain variables.

The studies reviewed in this paper have shown that … in tubeless radial tires, intracarcass pressure buildup and oxidative degradation from diffusing inflation air are also significant contributors to the propagation of belt edge separation in long-term wheel tests and road service".